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Early repair of traumatic rotator cuff tears improves functional outcomes

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Background: The impact of surgical timing on outcomes involving traumatic rotator cuff tears (RCTs) remains uncertain. The purpose of this study was to determine how functional outcomes are affected by surgical timing in traumatic RCTs.

Methods: We performed a retrospective review of patients with repair of traumatic full-thickness RCTs. Preoperative magnetic resonance imaging scans were evaluated by 2 blinded reviewers to measure RCT area and muscular atrophy. Functional outcomes were assessed via the American Shoulder and Elbow Surgeons (ASES) score, Single Assessment Numeric Evaluation (SANE) score, Simple Shoulder Test score, and visual analog scale (VAS) pain score. Patients were divided into 4 groups based on the time from injury to surgery: 0-2 months (group 1), 2-4 months (group 2), 4-6 months (group 3), and 6-12 months (group 4). Multivariate analysis was performed to assess the impact of surgical timing on functional outcomes. A subanalysis was performed to assess outcomes in patients who underwent surgery within 3 weeks of injury.

Results: The study included 206 patients (150 men and 56 women) with a mean age of 60.0 ± 9.7 years and a minimum of 24 months' clinical follow-up (mean, 35.5 months; range, 24-54.4 months). The average tear area was 8.4 ± 6.3 cm^2 in group 1 (66 patients), 5.8 ± 5.1 cm^2 in group 2 (76 patients), 5.1 ± 4.6 cm^2 in group 3 (29 patients), and 3.7 ± 3.1 cm^2 in group 4 (35 patients) ($P < .001$). There were significant differences between the 4 cohorts in the final postoperative ASES score ($P = .030$) and VAS pain score ($P = .032$). The multivariate regression demonstrated that patients who underwent surgery within 4 months of injury had estimated improvements of 10.3 points in the ASES score ($P = .008$), 1.8 points in the Simple Shoulder Test score ($P = .001$), 8.6 points in the SANE score ($P = .033$), and 0.93 points in the VAS pain score ($P = .028$) compared with patients who underwent surgery later. The subanalysis demonstrated that patients who underwent surgery within 3 weeks of injury (n = 13) had significantly better VAS ($P = .003$), ASES ($P = .008$), and SANE ($P = .019$) scores than patients who underwent surgery at between 3 weeks and 4 months after injury (n = 129).

Conclusions: This study demonstrates that surgical repair of traumatic RCTs results in significant improvements in functional outcomes for all patients; however, patients who undergo surgery within 3 weeks can expect the best functional outcomes, with a drop in function in patients who undergo surgery >4 months after injury.

Level of evidence: Level III; Retrospective Cohort Comparison; Treatment Study

Keywords: Rotator cuff repair; rotator cuff tear; timing; function; outcomes; traumatic tear; acute repair; delayed repair

Rotator cuff tears (RCTs) are the most common cause of shoulder pain and disability.[22] Tears most commonly occur in tendons that are weakened owing to degenerative changes and are chronic in nature. However, traumatic events can cause full-thickness RCTs in an estimated 8% of

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patients.[2] Although patient factors must always be considered, many surgeons would agree that traumatic RCTs should be repaired.[2,3,9,17,20,23]

There is a lack of evidence regarding the optimal surgical timing in traumatic RCTs.[2,9,23] Bassett and Cofield[2] found that patients with traumatic RCTs had better functional outcomes when repair was performed within 3 weeks of injury. More recent studies have conversely concluded that surgical timing in traumatic RCTs is a less crucial factor.[4,9,23] Petersen and Murphy[23] concluded that massive RCTs repaired after 4 months had worse function. Duncan et al[9] found that outcomes were better when repair was performed within 6 months of injury in a matched cohort. In addition to potentially improved functional outcomes, early repair of traumatic RCTs has several perceived advantages including easier tendon mobility and improved biomechanical properties of the tendon.[1,6,7,10-13,19,21,24,25] Therefore, evidence-based guidance on the acuity of surgical repair of traumatic tears is crucial to allow for optimal patient outcomes.

The primary purpose of this study was to determine how functional outcomes are affected by surgical timing in traumatic RCTs. The secondary purpose was to establish an optimal cutoff time for surgical repair. We hypothesized that a reduced time from injury to surgery would directly correlate with improved functional outcomes after rotator cuff repairs.

Methods

Patient selection

Patients were retrospectively identified through a database query of rotator cuff repairs performed by 1 of 6 shoulder and elbow fellowship-trained surgeons between January 2015 and August 2018 at a single institution. This query yielded 1897 surgical procedures. Patients were then screened for preoperative magnetic resonance imaging (MRI) and preoperative functional scores, resulting in 1026 cases. The inclusion criteria required patients to have a full-thickness RCT on MRI, to have a clinical depiction of a significant traumatic event, and to undergo surgical repair within 12 months of injury. Patients with irreparable tears, prior ipsilateral shoulder surgery, chronic ipsilateral shoulder pain, or rotator cuff muscle atrophy of grade 2b or higher were excluded.[23] Patients with isolated teres minor atrophy were allowed to be included. The minimum follow-up time from surgery was 24 months.

Study design

Patient charts were retrospectively reviewed to confirm a traumatic event and its timing to calculate the time from injury to surgery. Reviewers were blinded to outcome scores and tear characteristics. Demographic variables included age, sex, body mass index, and prior conservative treatment (injection or physical therapy). All MRI scans were independently reviewed by 2 shoulder and elbow fellowship-trained surgeons (C.D.J. and J.M.K.), who were blinded to the surgical timing and outcome scores. The MRI scans were reviewed to measure RCT area and muscular atrophy and to assess for muscle edema, bursal edema, and joint effusion. If the 2 reviewers did not agree on muscle atrophy, consensus was agreed on with the senior author (M.L.R.). Muscle atrophy was assessed via the grading system developed by Goutallier et al[15,16] and the global fatty degeneration index (GFDI). Tears were measured in 2 dimensions on the coronal and sagittal MRI cuts, and tear area was calculated by multiplying the 2 measurements. Any patient with rotator cuff muscle atrophy of grade 2b or higher was excluded.

Postoperative functional scores included the American Shoulder and Elbow Surgeons (ASES) score, Simple Shoulder Test (SST) score, Single Assessment Numeric Evaluation (SANE) score, and visual analog scale (VAS) score. Functional scores were collected via REDCap.[18] Revision surgery or a symptomatic retear of the rotator cuff repair was noted as well, and this was confirmed with direct operative visualization or definitive imaging (MRI or ultrasound) evidence.

Similarly to the study by Petersen and Murphy,[23] the patients were divided into groups based on the time from injury to surgery: 0-2 months (group 1), 2-4 months (group 2), 4-6 months (group 3), and 6-12 months (group 4). Functional outcomes, tear area, muscle atrophy, reoperation rates, and symptomatic retear rates were compared between the 4 groups. Receiver operator characteristic (ROC) curve analysis was performed to determine an optimal cutoff for surgical timing. Once established, a multivariate analysis was performed to assess the impact of surgical timing on functional outcomes. An additional subanalysis was performed to assess for a drop-off in functional scores at the 3-week post-injury time point for surgery based on the findings of the original article by Bassett and Cofield.[2]

Surgical technique and postoperative therapy

All rotator cuff repairs were performed arthroscopically with patients in the beach-chair position by 1 of 6 fellowship-trained shoulder and elbow surgeons. Surgical technique and implants differed among the 6 surgeons in the study and were not included in the analysis. All patients were placed in an abduction sling postoperatively for 6-8 weeks. Formal physical therapy started between 4 and 6 weeks postoperatively initially with passive and active-assisted motion, with progression to strengthening by 12 weeks. Patients were given progressive lifting restrictions for 6 months before being allowed to use the arm as tolerated.

Statistical analysis

We used t tests to calculate P values for parametric data and the Mann-Whitney U test for nonparametric data. The χ^2 or Fisher exact test was used to calculate P values for all categorical data. The Kruskal-Wallis test was undertaken for all nonparametric data, and analysis of variance was performed for parametric data. Correlational analysis was used to assess the effect of time to surgery, tear area, and atrophy characteristics on outcomes. Normalcy was assessed using the Shapiro-Wilk test. ROC curve analysis was performed on functional scores and time to surgery to assess for time cutoffs for outcomes. Additionally, multivariate

analysis was undertaken to determine the impact of demographic and tear characteristics on functional outcomes. All statistical analyses were performed using RStudio (version 3.6.1; Vienna, Austria).

Results

Patient selection

Of the 1064 patients whose charts were reviewed, 257 met the inclusion criteria (Fig. 1). Functional scores were obtained in 206 patients (80%), whereas 39 patients could not be contacted by telephone or e-mail, 10 declined, and 2 were deceased. The final groups included 66 patients with repair within 2 months of injury, 76 patients at 2-4 months, 29 patients at 4-6 months, and 35 patients at 6-12 months.

Entire cohort

The mean age at the time of surgery was 60.0 ± 9.7 years (range, 25-82 years), and patients had a mean follow-up time of 35.5 ± 9.7 months (range, 24.0-54.4 months). There were 150 male patients (72.8%) and 56 female patients (27.2%), and the average body mass index was 29.8 ± 5.3. Of the patients, 25 (12.1%) had workers' compensation claims (Table I). Preoperatively, 27 patients (13.1%) received a cortisone injection only, 43 (20.9%) underwent physical therapy, and 15 (7.3%) underwent both a cortisone injection and physical therapy. The mean time from injury to orthopedic evaluation was 50.8 ± 59.1 days (range, 0-300 days), and the mean time from injury to surgical repair was 108.4 ± 80.4 days (range, 11-363 days).

Overall, the mean functional scores following surgery for the entire cohort included a VAS pain score of 1.0 ± 2.0, ASES score of 88.2 ± 19.0, SANE score of 85.6 ± 18.8, and SST score of 10 ± 3. Patients experienced a net improvement of 3.9 ± 3.1 in the VAS pain score, 42.3 ± 24.7 in the ASES score, 42.3 ± 24.6 in the SANE score, and 6 ± 4 in the SST score ($P < .001$). The average tear area was 6.2 ± 5.4 cm^2, and the average GFDI was 0.8 ± 0.6. The GFDI significantly affected the SST score (Spearman $\rho = -0.207$, $P = .003$) but not the VAS pain score ($P = .775$), ASES score ($P = .378$), or SANE score ($P = .901$). On MRI, 201 patients (97.6%) had either muscle edema, bursal edema, or joint effusion. A symptomatic retear of the rotator cuff occurred in 21 patients (10.2%), and management included revision rotator cuff repair in 8, reverse shoulder arthroplasty in 1, and nonoperative treatment in 12. No significant association was found between symptomatic retear rate and time to surgery ($P = .144$), tear area ($P = .690$), or GFDI ($P = .555$). Workers' compensation patients had significantly worse final postoperative VAS pain scores (2.3 vs. 0.9, $P = .049$). Although there were trends toward lower ASES (77.5 vs. 89.7, $P = .053$), SANE (78.1 vs. 86.7, $P = .120$), and SST (10 vs. 11, $P = .220$) scores in workers' compensation patients, these did not reach statistical significance.

Group analysis

Tear area was significantly larger in group 1 and smaller in group 4 ($P < .001$), and no significant differences in GFDI ($P = .188$) and symptomatic retear rate ($P = .180$) were identified (Table I). Patients in groups 3 and 4 were significantly more likely to have undergone physical therapy or a cortisone injection prior to surgery ($P < .001$).

Patients who underwent earlier rotator cuff repair (group 1) had significantly worse preoperative ASES ($P = .001$), SST ($P < .001$), and SANE ($P = .014$) scores (Table II). In all 4 groups, patients' postoperative VAS, ASES, and SANE scores significantly improved after surgery and exceeded the respective minimal clinically important differences (MCIDs) reported in the literature (MCIDs of 11-27.1 for the ASES score, 16.9 for the SANE score, 4.3 for the SST score, and 2.4 for the VAS score).[8,26] In patients who underwent surgery within 6 months (groups 1, 2, and 3), the improvement in the SST score surpassed the MCID (4.3), whereas in patients who received surgery 6-12 months after injury (group 4), it did not.[26] Furthermore, earlier repair was associated with significantly better final postoperative ASES ($P = .030$) and VAS ($P = .032$) scores, as well as significantly larger net improvements in ASES ($P = .004$) and SST ($P < .001$) scores. Additionally, groups 1 and 2 trended toward a lower symptomatic retear rate (7.7% vs. 15.6%); however, this did not reach significance ($P = .139$).

ROC curve analysis

The ROC curve analysis of the postoperative ASES, SANE, and SST scores established that surgery within 4 months of injury was the optimal time for rotator cuff repair (Fig. 2). However, only moderate predictive capabilities were found for the ASES score (area under the curve [AUC], 0.616; sensitivity, 0.650; and specificity, 0.594), SANE score (AUC, 0.572; sensitivity, 0.405; and specificity, 0.766), and SST score (AUC, 0.571; sensitivity, 0.905; and specificity, 0.266).

Multivariate analysis

The multivariate regression included patient demographic characteristics, tear area, preoperative ASES score, and time to repair as the independent variables and postoperative ASES, SST, SANE, and VAS scores as the dependent variables (Table III). A shorter time to repair was associated with significantly better functional outcomes universally when accounting for these additional variables. Repair within 4 months after injury resulted in an estimated improvement of 10.3 points in the ASES score ($P = .008$),

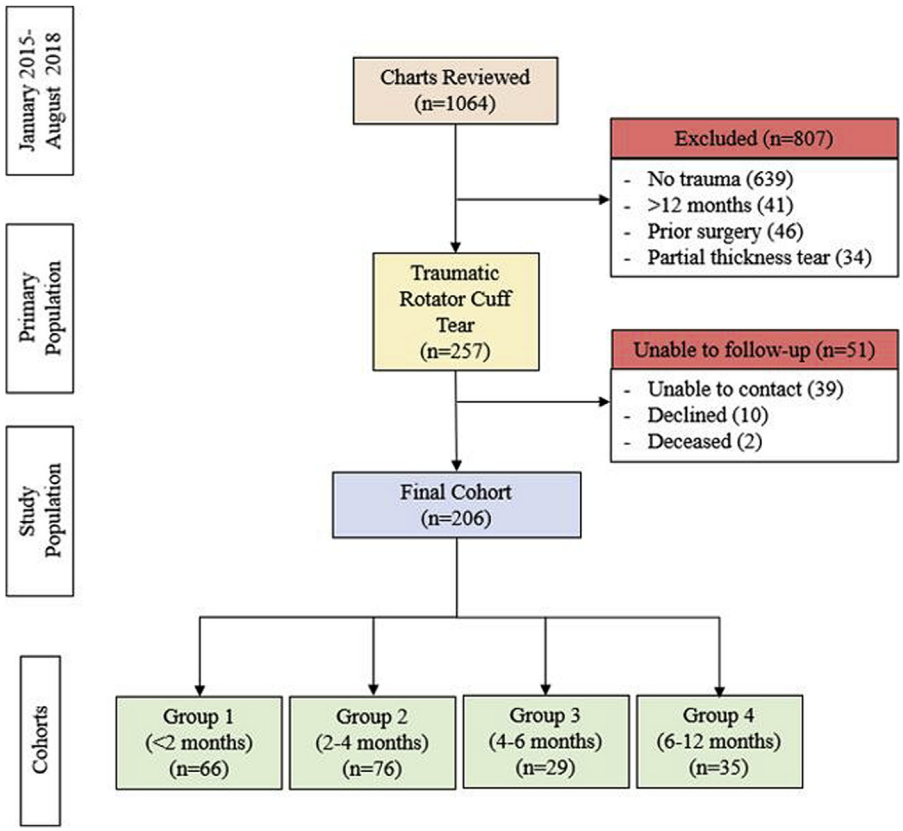

Figure 1 Flow diagram depicting patient inclusion process.

1.8 points in the SST score ($P = .001$), 8.6 points in the SANE score ($P = .033$), and 0.93 points in the VAS pain score ($P = .028$). The tear area did not affect the ASES score ($P = .315$), SST score ($P = .543$), SANE score ($P = .221$), or VAS pain score ($P = .383$). Additionally, workers' compensation status was associated with inferior ASES scores ($P = .019$), and male sex was associated with improved SST scores ($P = .012$). No other preoperative factors showed correlations with functional scores.

Three-week cutoff

A subanalysis was performed comparing patients with a time to repair within 3 weeks (n = 13) and those with a time to repair of between 3 weeks and 4 months (n = 129). Patients undergoing surgery within 3 weeks of injury had significantly better postoperative VAS (0.2 vs. 0.9, $P = .003$), ASES (96.6 vs. 90.0, $P = .008$), and SANE (93.9 vs. 86.4, $P = .019$) scores but not SST scores (11 vs. 11, $P =$

Table I Tear characteristics by group

	Patients	Age, yr	Male sex, n (%)	BMI, kg/m^2	Workers' compensation, n (%)	Tear area, cm^2	GFDI	Symptomatic retear, n (%)
Group								
0-2 mo	66	60.5 ± 8.6	54 (81.8)	29.7 ± 5.1	12 (18.2)	8.4 ± 6.3	0.8 ± 0.6	6 (9.2)
2-4 mo	76	57.9 ± 10.5	53 (69.7)	29.6 ± 5.3	9 (11.8)	5.8 ± 5.1	0.8 ± 0.6	5 (6.5)
4-6 mo	29	63.0 ± 9.0	22 (75.9)	31.2 ± 6.9	3 (10.3)	5.1 ± 4.6	0.9 ± 0.5	3 (10.3)
6-12 mo	35	61.2 ± 9.9	21 (60.0)	29.9 ± 4.2	1 (2.9)	3.7 ± 3.1	0.6 ± 0.6	7 (20.0)
P value		.078*	.106†	.901*	.159‡	.001*,§	.188*	.180‡
Combined	206	60.0 ± 9.7	150 (72.8)	29.8 ± 5.3	25 (12.1)	6.2 ± 5.4	0.8 ± 0.6	21

BMI, body mass index; *GFDI*, global fatty degeneration index.
* Statistics performed via Kruskal-Wallis test.
† Statistics performed via χ^2 test.
‡ Statistics performed via Fisher exact test.
§ Statistically significant ($P < .05$).

Table II Pain and functional outcomes

Group	ASES score			SST score			SANE score			VAS pain score		
	Preop	Postop	Δ	Preop	Postop	Δ	Preop	Postop	Δ	Preop	Postop	Δ
0-2 mo	37.7 ± 19.0	89.0 ± 19.6	50.5 ± 23.6	3 ± 3	11 ± 2	8 ± 4	27.7 ± 21.6	84.9 ± 19.9	56.4 ± 28.3	5.6 ± 2.7	1.1 ± 2.3	−4.4 ± 3.2
2-4 mo	49.7 ± 19.7	91.9 ± 13.0	42.1 ± 24.2	5 ± 3	11 ± 2	6 ± 3	38.1 ± 21.4	89.0 ± 14.1	51.3 ± 26.8	4.7 ± 2.8	0.6 ± 1.3	−3.8 ± 3.4
4-6 mo	46.3 ± 16.7	82.6 ± 20.8	36.3 ± 22.5	5 ± 3	10 ± 4	5 ± 4	39.3 ± 18.9	82.8 ± 19.9	43.5 ± 28.8	5.4 ± 1.9	1.6 ± 2.1	−3.8 ± 2.2
6-12 mo	50.8 ± 15.4	83.6 ± 25.1	32.8 ± 25.2	5 ± 3	9 ± 3	4 ± 3	38.5 ± 17.5	82.1 ± 23.6	43.3 ± 25.6	4.9 ± 2.4	1.4 ± 2.6	−3.4 ± 3.0
P value*	.001†	.030†	.004†	<.001†	.154	<.001†	.014†	.290	.079	.310	.032†	.393
Combined (0-12 mo)	45.6 ± 19.1	88.2 ± 19.0	42.3 ± 24.7	4 ± 3	10 ± 3	6 ± 4	35.0 ± 20.9	85.6 ± 18.8	42.3 ± 24.6	5.1 ± 2.6	1.0 ± 2.0	−3.9 ± 3.1

ASES, American Shoulder and Elbow Surgeons; *SST*, Simple Shoulder Test; *SANE*, Single Assessment Numeric Evaluation; *VAS*, visual analog scale; *Preop*, preoperative; *Postop*, postoperative.

* Statistics performed via Kruskal-Wallis test.

† Statistically significant ($P < .05$).

.064). In both groups, patients' postoperative scores significantly improved after surgery and exceeded the MCIDs for the VAS, ASES, SANE, and SST scores for rotator cuff repairs.

Discussion

All groups in this study experienced significant improvements in the ASES, SANE, and VAS scores. All surpassed their respective MCIDs for rotator cuff repairs.[8,26] Improvement in the SST score exceeded the MCID in groups 1, 2, and 3, whereas that in group 4 approached the MCID but was 0.3 short.[8,26] However, patients who undergo surgery within 4 months of injury can expect to have improvements in the ASES score by 10.3 points, SST score by 1.8 points, SANE score by 8.6 points, and VAS score by 0.93 points compared with those who undergo repair after 4 months. The results of this study support the initial hypothesis, whereby earlier repair of traumatic RCTs showed better functional outcomes at a minimum 2-year follow-up.

Finding an appropriate cutoff time for repairing traumatic RCTs has been elusive for decades.[2,9,23] In 1983, Bassett and Cofield[2] found that patients who underwent repair within 3 weeks of injury had significantly better forward elevation. However, their study only included 37 patients with surgical repair within 3 months of injury, and muscle atrophy was not assessed. In 2011, Petersen and Murphy[23] determined that patients who received surgery within 4 months of injury had superior forward elevation and ASES scores. Their study similarly had a small sample size of 42 patients and had a minimum of only 9 months of follow-up. In 2015, Duncan et al[9] determined that patients who underwent surgery within 6 months of injury had superior outcomes. Again, their study only compared outcomes in 40 patients, and the average follow-up was <1 year postoperatively. A thorough review of the literature shows that no high-volume studies with a minimum of 24 months' follow-up have truly determined the impact of surgical timing on the functional outcomes of traumatic RCTs.

The results of our study suggest that the optimal time to repair traumatic RCTs is within 3 weeks of the traumatic event. The subgroup analysis demonstrated that repair within 3 weeks of injury had the best functional results. However, this was a small group (13 patients), so the implications are difficult to validate by multivariate analysis. When we compared the 4 cohorts, 4 months appeared to be the most appropriate cutoff time as demonstrated by the multivariate regression. Because the strength of the ROC curve analysis for the ASES score was low (AUC, 0.616), it is likely that the decline in functional outcomes is more of a gradual occurrence instead of a true drop-off. Additionally, these findings occurred in the setting of larger tears being repaired earlier. In this study, all patients with massive tears (>18 cm^2) underwent repair within the first 4 months of

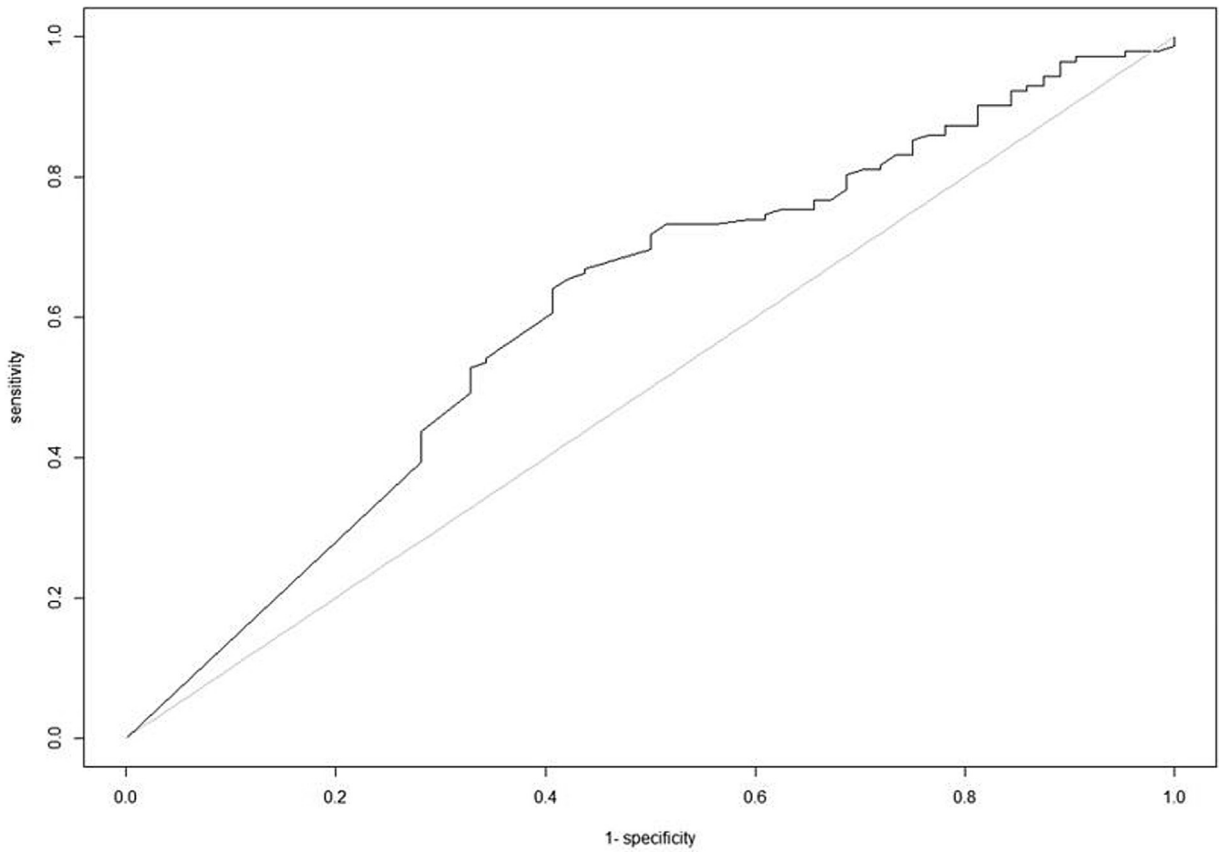

Figure 2 Receiver operating curve for effect of time on American Shoulder and Elbow Surgeons score for entire cohort.

injury, and all tears $\geq$ 11 cm^2 were repaired within 5 months of injury. Furthermore, increased tear size did not result in either inferior functional outcomes or an increase in symptomatic retear rates. On the basis of our study findings, we believe that rotator cuff repair should be performed within 3 weeks of the traumatic event to achieve the best results and within 4 months of injury to prevent significant functional limitations.

Although the statistical analysis supports an association between an earlier time to repair and improved scores, the clinical implications may not be as clear-cut. The MCID for the ASES score in patients undergoing rotator cuff repair has been debated but is commonly cited as between 11.1 and 27.1. In all 4 groups in our study, the ASES score improved by >27.1 after surgery.[8,26] Furthermore, the postoperative improvements in the SANE, VAS, and SST

Table III Multivariate analysis

Variable	ASES score		SST score		SANE score		VAS pain score	
	Estimate	*P* value	Estimate	*P* value	Estimate	*P* value	Estimate	*P* value
Age	0.04	.821	−0.02	.469	−0.04	.817	−0.01	.683
BMI	−0.24	.433	−0.06	.120	−0.10	.749	0.02	.571
Male sex	4.2	.262	1.2	.012*	−0.15	.970	−0.41	.319
Tear area	−0.28	.315	−0.02	.543	−0.36	.221	0.03	.383
Preoperative ASES score	0.15	.054	0.01	.234	0.12	.154	−0.02	.049*
Workers' compensation	−11.1	.019*	−1.2	.061	−9.0	.071	1.0	.055
Time to surgery	−10.3	.008*	−1.8	.001*	−8.6	.033*	0.93	.028*

ASES, American Shoulder and Elbow Surgeons; *SST*, Simple Shoulder Test; *SANE*, Single Assessment Numeric Evaluation; *VAS*, visual analog scale; *BMI*, body mass index.

* Statistically significant ($P < .05$).

scores exceeded the MCIDs in all groups, except for the SST score in patients with surgery 6-12 months after injury. The multivariate analysis indicated that patients undergoing surgery within 4 months of injury achieved better ASES, SANE, SST, and VAS scores. Similarly, patients who underwent surgery within 3 weeks of injury had superior outcomes for the VAS score ($P = .003$), ASES score ($P = .008$), and SANE score ($P = .019$) compared with those with surgery between 3 weeks and 4 months after injury. Therefore, although nearly all patients showed clinically meaningful improvements in the ASES, SANE, SST, and VAS scores, the patients who underwent repair earlier demonstrated even better results.

It is worthwhile to note that RCTs that were repaired within the first 2 months of injury were significantly larger. This finding is likely explained by the fact that these patients more likely were referred to an orthopedic surgeon more quickly and underwent an operative intervention suggested earlier by their surgeon. Additionally, patients with larger tears are less likely to undergo a course of conservative treatment prior to surgery, as evidenced in this study as well. Finally, despite having worse injuries, patients with earlier repairs had significantly better postoperative ASES scores and VAS pain scores, in addition to larger net improvements in the ASES and SST scores. The significance of the postoperative score improvement is more evident in the multivariate analysis when preoperative tear area, workers' compensation status, and preoperative function are accounted for.

The findings of this study have several important implications in the management of traumatic RCTs. Although a case-by-case approach should always be applied to each patient with a cuff tear, orthopedic surgeons should understand that an earlier repair may yield a better functional result. Whereas many orthopedic surgeons likely understand the difference between a traumatic RCT and a degenerative RCT, primary care providers may not. RCTs are commonly treated conservatively for prolonged periods even after a traumatic event, whether based on dogma, the inability to obtain an MRI scan, or insurance obstacles.[5,14,27,28] It is important for all providers to be aware that surgical timing in traumatic RCTs is important, and early MRI diagnosis is also important. In our experience, the mean time to initial presentation to an orthopedic surgeon was nearly 2 months after the injury. Owing to the delayed presentation to an orthopedic surgeon and gradual decline in outcomes that occurs with a delayed operation, it is imperative for providers to obtain MRI scans expediently to allow for the best outcomes. Furthermore, it is important for all providers and patients to be aware that as additional time passes, the results of traumatic rotator cuff repairs may be less optimal. Therefore, we believe that if a course of conservative treatment is chosen, it should be limited to several weeks instead of several months.

This study has several limitations. First, its retrospective design leads to an inherent bias. Second, although the final follow-up rate was strong, at 80%, there still may be selection bias on account of the missed patients. Third, the technique used for measuring tear size was based on 2-dimensional MRI cuts and may not be as accurate as using a volumetric measurement. Fourth, patients did not routinely undergo postoperative MRI or ultrasound imaging of the rotator cuff. Thus, the true retear rate for each group is unknown. Fifth, although we were diligent in only screening for patients with a legitimate traumatic event, the mechanism of injury can be subjective in terms of defining true trauma. Sixth, whereas all patients were asked on what date the initial trauma occurred, recall error may have occurred, resulting in inaccurate recall of the date of injury. Finally, there were disproportionately larger and more debilitating tears in the 0- to 2-month repair group, which may have altered the results as the groups were not uniform; however, this was accounted for in the multivariate analysis.

Conclusion

Earlier surgical repair of traumatic RCTs results in significantly better functional outcomes. Although there is a gradual decline in scores as the repair time increases, repair within 3 weeks of injury is the optimal time for repair, with a further drop-off in function occurring >4 months after injury.

Disclaimers

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