Timing of Corticosteroid Injection Within One Year Prior to Rotator Cuff Repair Does Not Impact Patient Outcomes

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Introduction: Initial non-operative management is usually recommended for atraumatic rotator cuff tears and often includes a corticosteroid injection (CSI). Concerns exist regarding corticosteroid effect on cuff tendon quality, especially if patients ultimately undergo rotator cuff repair (RCR). Animal studies and limited clinical studies have suggested there may be a detrimental effect depending on timing and dosage of injection. However, the impact of timing for a single CSI on RCR outcomes remains uncertain. This study aimed to evaluate if timing of CSI within one year prior to RCR affects rotator cuff failure, patient-reported outcomes (PROs), range of motion (ROM), and strength when compared to controls who did not receive CSI. We hypothesized that injection within 3 months of RCR would demonstrate higher rates of operative failure as well as lower scores for PROs, ROM, and strength.

Methods: This is a retrospective cohort study of patients who received subacromial CSI before arthroscopic or open RCR compared to patients with no history of pre-operative CSI. Data was obtained via electronic medical records for patients diagnosed with rotator cuff tear from 2015 to 2022. Inclusion criteria was age ≥ 18 years old, primary RCR, non-operative management ≥ 6 weeks before RCR, and ≥ 1 year of follow-up post-operatively. Patients who had prior ipsilateral shoulder surgery, traumatic etiology, or <6 weeks of conservative management were excluded. Patients who received CSI were stratified based on timing of most recent CSI relative to RCR: <3 months, 3-6 months, and 6 months-1 year before surgery. Primary outcome was failure of repair, defined as reoperation or retear confirmed on magnetic resonance imaging. Secondary outcomes included PROs, strength, and range of motion (ROM). PROs included Subjective Shoulder Value (SSV), PROMIS Mental Health score, PROMIS Physical Health Score, American Shoulder and Elbow Surgeons (ASES) score, and Visual Analog Scale (VAS).

Results: A total of 198 patients were included in this study, 109 with preoperative CSI and 89 controls. In the CSI cohort, 44 patients had a CSI within 3 months of surgery, 34 patients 3-6 months prior, and 31 patients 6 months-1 year prior. Mean ages were 59, 59, 63, and 57 years, respectively (p=0.125). Mean follow-up was 15 months. No differences in demographic characteristics were observed between groups (all $p > 0.05$). Single versus double row repair (p=0.227) and number of tendons involved did not differ between groups (p=0.572). Repair failure was seen in 27/89 controls (30%), 9/44 patients (20%) receiving injections < 3 months, 6/34 (17.65%) patients with injection 3-6 months, and 6/31 (19.35%) patients with injection 6 months-1 year prior (p=0.34). For those who received CSI, significant decreases from pre-op to post-op were seen in average VAS score (7.06 vs 4.02, $p<0.001$) and external rotation (52 vs 48 p=0.019). Increases were seen in SSV (57 vs 78, $p<0.001$) and ASES score (50 vs 65, p=0.002), with similar improvements in the controls (all $p > 0.050$). Post-operative forward flexion strength was more likely to decrease relative to pre-op in patients who received CSI 6 months to one year before RCR (p=0.008). Otherwise, PROs and functional outcomes did not differ significantly between controls and CSI patients at all timepoints.

Conclusion: This study showed that outcomes for patients who receive CSI within one year prior to RCR were comparable regardless of injection timing, and largely equivocal to controls. Few studies have described how timing of a single preoperative CSI impacts RCR outcomes. Patients who received subacromial CSI within one year prior to RCR had similar outcomes at one year follow-up to those patients who had no pre-operative CSI. Timing of injection had no impact on outcomes except for decrease in forward flexion strength from pre- to post-op for those who received CSI 6 months to 1 year prior to RCR. A single CSI remains a useful tool for non-operative management of rotator cuffs and may not impact future RCR outcomes regardless of the time administered.

Table 1: One-year follow-up outcome data of CSI and control groups – Retear and PROs

Outcome	Control (n=89)	CSI, < 3 months (n=44)	CSI, 3-6 months (n=34)	CSI, 6-12 months (n=31)	P-value

Retear and/or Reoperation, n (%)	27 (30.34)	9 (20.45)	6 (17.65)	6 (19.35)	0.340
Reoperation Type, n (%)	N=23	N=5	N=5	N=5	0.384
Revision RCR	14 (60.87)	2 (40)	2 (40)	2 (40)	--
Conversion to TSA	1 (4.35)	0 (0)	0	1 (20)	
Conversion to rTSA	5 (21.74)	1 (20)	1 (20)	1 (20)	
VAS, mean (SD)					
Preop	6.75 (2.15)	7.24 (1.74)	6.56 (2.34)	6.5 (1.98)	0.633
Postop	3.44 (3.02)	3.86 (3.20)	3.17 (2.99)	4.58 (2.91)	0.573
SSV, %					
Preop	47.91 (24.21)	50.5 (22.99)	56.39 (19.31)	50.05 (23.91)	0.634
Postop	76.85 (24.99)	73.95 (21.25)	84.5 (14.24)	78.63 (18.11)	0.540
ASES score					
Preop	52.54 (22.51)	40.84 (21.05)	55.3 (18.74)	57.73 (15.93)	0.153
Postop	65.13 (23.5)	62.21 (25.77)	66.87 (24.45)	57.11 (21.43)	0.690
PROMIS-M					
Preop	15.11 (4.01)	13.75 (2.74)	16.12 (3.1)	11.43 (4.20)	**0.0231**
Postop	15.10 (3.84)	13.73 (3.49)	14.95 (2.12)	12.45 (3.47)	0.097
PROMIS –P					
Preop	14.38 (3.26)	12 (2.85)	13.35 (2.62)	11.43 (2.82)	**0.033**
Postop	14.50 (3.76)	13.73 (2.91)	13.32 (2.81)	12.55 (2.25)	0.282
Strength (MMT), %	--	--	--	--	--
Preop FF					**0.023**
3/5	4.76	0	0	3.57	
4/5	76.19	58.97	54.84	57.14	
5/5	19.05	41.03	45.16	39.29	
Postop FF					0.381
3/5	1.37	2.70	3.45	8.70	
4/5	28.77	29.73	20.69	39.13	
5/5	69.86	67.57	75.86	52.17	
Preop IR					**0.040**
4/5	42	16	14.29	31.58	
5/5	58	84	85.71	68.42	
Postop ER					0.320
4/5	20	6.25	15.38	21.05	
5/5	80	93.75	84.62	78.95	

Significant P-values are bolded.