Comparison of the Efficacy of Rotator Interval versus Posterior Approach for Intra-articular Corticosteroid Injections for Primary Frozen Shoulder: A Randomized Controlled Trial

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INTRODUCTION:

Intra-articular (IA) corticosteroid injection is commonly performed in patients with primary frozen shoulder (PFS). However, the best administration site remains controversial. The aim of this study was to compare the efficacy of rotator interval versus posterior approach for ultrasound-guided corticosteroid injections into the glenohumeral (GH) joint in patients with PFS.

METHODS:

Ninety PFS patients were randomly assigned to either rotator interval approach (RI group, n = 43) or posterior capsule approach (PC group, n = 45) for ultrasound-guided IA corticosteroid injection. Fluoroscopic images to assess the accuracy of the injection were obtained immediately after injection by a shoulder specialist. Visual analog scale (VAS) for pain, the American Shoulder and Elbow Surgeons (ASES) score, the subjective shoulder value (SSV), and range of motion (ROM) were used for assessment of clinical outcomes for all patients at the time of presentation, 3, 6, and 12 weeks after injection.

RESULTS:

At baseline, there were no significant differences in age, sex, the affected side, the presence of diabetes, body mass index, duration of symptoms, and clinical scores between the two groups FS ($P > 0.05$) (Table 1). The accuracy of injection was 76.7% (33/43) and 93.3% (42/45) in the RI and PC groups, respectively; this difference was significant ($P = .028$). Significant improvements were observed in both groups in terms of all clinical scores and ROMs throughout follow-up until 12 weeks after injection (all $P < .001$). At 12 weeks, better improvements in forward flexion and abduction ($P = .049$ and .044) were observed in the RI group compared with the PC group (Table 2). Significant improvements in all outcome measures ($P < .001$ for all parameters) including VAS, ASES scores, SSVs, and ROMs through 12 weeks were observed in both the success (n = 33) and failure subgroups (n = 10). No significant differences in all outcome measures were observed between the two subgroups, except the failure subgroup showed a significantly higher improvement of the degree of abduction in ROMs compared to the success subgroup at three weeks after injection (p=0.048) (Table 3).No adverse effect related to injection was observed in either group.

DISCUSSION AND CONCLUSION: Both groups showed significant pain reduction and functional improvement until 12 weeks after injection. Although no significant differences were observed in pain and functional scores between the two groups, the RI group showed better improvement of ROM than the PC group. These results indicate that the rotator interval and anterior structures are a major site in the pathogenesis and treatment target of PFS.

Table 1. Baseline demographics of patients with PFS.

Variable	RI Group	PC Group	*P* Value
Number of patients	43	45	
Age*	54.14±8.87	55.44±9.93	.518
Male:female (no.)	25:18	20:25	.199
Right:left (no.)	19:24	28:17	.090
Diabetes (no.)	7	7	.926
Body mass index (kg/m²)	23.63±2.98	23.69±2.55	.923
Duration of symptoms (months)*	9.35±14.74	10.00±11.26	.816
Initial clinical score*			
VAS	6.81±2.48	6.56±2.15	.602
ASES	40.23±21.00	39.96±16.25	.946
SSV	43.02±20.18	41.33±18.01	.679
Initial ROM*			
Forward flexion	118.37±23.60	115.11±24.23	.524
Abduction	101.05±25.90	101.56±27.22	.929
External rotation	41.74±18.61	40.89±20.84	.840
Internal rotation	17.74±2.01	18.04±2.28	.515

*The values are given as the mean and SD.

Table 2. Serial changes and statistical analysis of outcome measures between RI group and PC group at each time point.

Variables	Baseline	3 weeks	6 weeks	12 weeks
VAS				
RI group	6.92±2.54	2.46±1.27	2.13±1.26	2.59±2.22
PC group	6.41±2.27	2.51±1.15	1.89±1.05	2.35±1.58
P value	0.352	0.852	0.378	0.594
ASES				
RI group	39.62±21.39	75.00±11.17	80.47±10.46	77.39±19.01
PC group	41.04±16.78	75.90±9.33	80.99±9.25	77.75±12.61
P value	0.749	0.705	0.819	0.924
SSV				
RI group	41.79±20.76	68.97±15.85	77.31±13.42	74.49±18.69
PC group	42.97±18.35	72.68±12.22	77.14±11.47	74.46±12.90
P value	0.794	0.260	0.952	0.994
Forward flexion				
RI group	119.10±23.81	144.36±17.55	152.44±15.93	156.15±16.95
PC group	112.97±24.42	139.73±17.28	147.30±17.22	148.51±16.24
P value	0.272	0.251	0.181	0.049*
Abduction				
RI group	100.38±26.52	130.26±22.77	139.74±20.84	144.74±22.85
PC group	98.65±26.79	125.95±19.22	133.11±20.25	134.46±20.88
P value	0.777	0.377	0.164	0.044*
External rotation				
RI group	41.41±18.92	59.87±13.10	65.26±12.19	66.67±14.57
PC group	39.19±20.57	55.95±12.74	60.95±13.84	62.16±13.36
P value	0.625	0.190	0.153	0.165
Internal rotation				
RI group	17.74±2.07	13.44±2.49	11.74±3.07	11.59±3.18
PC group	18.11±2.26	13.59±2.81	12.76±2.67	12.49±3.08
P value	0.466	0.795	0.130	0.216

*Statistically significant.

Table 3. Serial changes and statistical analysis of outcome measures between success subgroup and failure subgroup depending on the results in the RI group at each time point.

Variables	Baseline	3 weeks	6 weeks	12 weeks
VAS				
Success subgroup	6.97±2.62	2.43±1.14	2.17±1.32	2.87±2.32
Failure subgroup	6.78±2.39	2.56±1.74	2.00±1.12	1.67±1.66
P value	0.848	0.805	0.733	0.158
ASES				
Success subgroup	39.56±21.56	74.61±9.93	79.94±11.23	74.89±19.95
Failure subgroup	39.81±22.09	76.30±15.27	82.22±7.64	85.74±13.15
P value	0.975	0.697	0.574	0.135
SSV				
Success subgroup	43.67±20.59	67.33±16.63	76.83±13.74	71.9±19.18
Failure subgroup	35.56±21.28	74.44±12.10	78.89±12.94	83.11±14.73
P value	0.310	0.243	0.692	0.116
Forward flexion				
Success subgroup	115.17±23.17	141.50±17.38	150.67±16.12	154.5±17.14
Failure subgroup	132.22±22.24	153.89±15.37	158.33±14.58	161.67±16.01
P value	0.058	0.062	0.210	0.272
Abduction				
Success subgroup	98.00±24.62	126.33±22.82	137.67±21.61	142.5±23.22
Failure subgroup	108.33±32.40	143.33±18.03	146.67±17.32	152.22±21.08
P value	0.312	0.048*	0.261	0.269
External rotation				
Success subgroup	40.17±17.98	57.83±12.3	64.83±12.35	65.33±14.79
Failure subgroup	45.56±22.42	66.67±14.14	66.67±12.25	71.11±13.64
P value	0.461	0.076	0.698	0.303
Internal rotation				
Success subgroup	17.83±2.12	13.63±2.66	11.77±3.27	11.93±3.24
Failure subgroup	17.44±2.01	12.78±1.79	11.67±2.45	10.44±2.83
P value	0.628	0.373	0.933	0.222

*Statistically significant.