Effect of Different Techniques of Non – Anatomical Repair of Anterior Shoulder Instability (Latarjet Procedures) on Patient's Response to Rehabilitation

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Abstract

Purpose : The purpose of this study was to investigate effects of labrum preservation or removal on shoulder pain, mobility, strength and proprioception in patients with anterior shoulder instability repair.

Backgrounds/Significance : Anterior shoulder instability is a common traumatic injury that may be complicated with recurrent episodes of symptomatic instability. When instability is associated with soft tissue or bony defects, open repair is the preferred surgical intervention. Latarjet procedure is one of non-anatomical techniques used for such cases in which coracoid and its conjoined tendon is transferred to anterior glenoid. This compensates for the capsulolabral and osseous injury by an osseous or soft-tissue checkrein that blocks excessive translation and restores stability. This procedure could be done while preserving or removing the gelnoid labrum, depending on its integrity. Glenoid labrum increases glenohumeral joint congruency, stability and proprioception. Thus, its removal may affect joint integrity and hence patients' functional outcome. This in turn may influence the selection of rehabilitation protocols of those patients. To the authors' knowledge, there is no published evidence on changes in functional outcome in response to labrum removal or preservation.

Subjects : Twenty eight patients with age ranged between 22 and 52 years old were enrolled in this study. All patients have undergone Latarjet procedure for correction of recurrent shoulder instability and were referred for rehabilitation 2 weeks post-operatively. Patients were excluded if they showed any postoperative signs of recurrent instability, had any systematic or neurological disease that could interfere with shoulder function, or received previous corticosteroid injections into the operated shoulder. Based on the surgical technique, patients were divided into labrum preserved group (n=14), and labrum removed group (n=14).

Methods and Materials : After initial baseline assessment and examination, all patients received a standardized physical therapy rehabilitation protocol that was designed by Brigham and Women's Hospital, U.S.A.[1] Briefly, this program consists of range of motion, open and closed kinetic chain exercises. Patients were treated during the immediate post-surgical phase that focuses on pain relief and enhancing the healing process; and the intermediate phase that primarily targets the restoration of shoulder motions; and the muscle strengthening phase.

Pain severity, shoulder range of motion and muscle strength was quantified using the shoulder pain score, a digital inclinometer and a hand-held muscle tester, respectively. Proprioception acuity was measured using the closed kinetic chain upper extremity stability test (CKCUET). All measurements were done at 2nd (during phase I) and 16th weeks (at the end of Phase III).

Analyses : Repeated measures ANOVA using SPSS version 21.0. Significance level was set at $p<0.05$ throughout all analyses. Data are presented as means and SD.

Results : Within group comparisons showed significant improvement in all measured variables between the 2nd and 16th weeks in patients of two groups ($p<0.01$).

Between groups comparison showed significant improvement in patients with labrum preservation regarding proprioception acuity ($p<0.011$, figure 01). Patient with labrum removal showed significantly greater improvement in pain severity ($p<0.001$, figure 02) and external rotation range of motion ($p<0.001$, figure 03).

Conclusion : Labrum preservation improves shoulder proprioception. On the other hand, labrum removal, when indicated, significantly improves pain and external rotation range following latarjet operation. Biomechanical and neurophysiological analysis as well as long term follow up is recommended to explain reported results.

References

1. The Brigham and Women's Hospital Inc.: Anterior Stabilization of the Shoulder: Latarjet Protocol., UK.

Pairwise Comparisons

Measure	Group	(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.^{b}	95% Confidence Interval for	
							Lower Bound	Upper Bound
flexion	Preservation	1	2	-3.850-*	.333	.000	-4.535-	-3.165-
		2	1	3.850*	.333	.000	3.165	4.535
	Removal	1	2	-3.107-*	.333	.000	-3.792-	-2.422-
		2	1	3.107*	.333	.000	2.422	3.792
Abduction	Preservation	1	2	-4.086-*	.236	.000	-4.571-	-3.601-
		2	1	4.086*	.236	.000	3.601	4.571
	Removal	1	2	-3.357-*	.236	.000	-3.842-	-2.872-
		2	1	3.357*	.236	.000	2.872	3.842
Ext_rot	Preservation	1	2	-3.986-*	.267	.000	-4.535-	-3.437-
		2	1	3.986*	.267	.000	3.437	4.535
	Removal	1	2	-2.564-*	.267	.000	-3.113-	-2.015-
		2	1	2.564*	.267	.000	2.015	3.113
Int_rot	Preservation	1	2	-3.957-*	.369	.000	-4.715-	-3.199-
		2	1	3.957*	.369	.000	3.199	4.715
	Removal	1	2	-3.336-*	.369	.000	-4.094-	-2.578-
		2	1	3.336*	.369	.000	2.578	4.094
CKCUT	Preservation	1	2	-8.429-*	.570	.000	-9.601-	-7.256-
		2	1	8.429*	.570	.000	7.256	9.601
	Removal	1	2	-5.929-*	.570	.000	-7.101-	-4.756-
		2	1	5.929*	.570	.000	4.756	7.101
Pain	Preservation	1	2	4.732*	.344	.000	4.025	5.439
		2	1	-4.732-*	.344	.000	-5.439-	-4.025-
	Removal	1	2	5.714*	.344	.000	5.007	6.421
		2	1	-5.714-*	.344	.000	-6.421-	-5.007-
St_flexion	Preservation	1	2	-15.000-*	1.520	.000	-18.124-	-11.876-
		2	1	15.000*	1.520	.000	11.876	18.124
	Removal	1	2	-21.929-*	1.520	.000	-25.053-	-18.804-
		2	1	21.929*	1.520	.000	18.804	25.053
St_Abd	Preservation	1	2	-18.071-*	2.000	.000	-22.181-	-13.961-
		2	1	18.071*	2.000	.000	13.961	22.181
	Removal	1	2	-22.786-*	2.000	.000	-26.896-	-18.676-
		2	1	22.786*	2.000	.000	18.676	26.896
St_ext_rot	Preservation	1	2	-16.357-*	1.611	.000	-19.669-	-13.045-
		2	1	16.357*	1.611	.000	13.045	19.669
	Removal	1	2	-21.857-*	1.611	.000	-25.169-	-18.545-
		2	1	21.857*	1.611	.000	18.545	25.169
St_int_rot	Preservation	1	2	-19.571-*	1.561	.000	-22.780-	-16.362-
		2	1	19.571*	1.561	.000	16.362	22.780
	Removal	1	2	-17.143-*	1.561	.000	-20.352-	-13.934-
		2	1	17.143*	1.561	.000	13.934	20.352

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure	time		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
flexion	1	Contrast	90.720	1	90.720	4.564	.042	.149	4.564	.539
		Error	516.777	26	19.876					
	2	Contrast	132.023	1	132.023	5.119	.032	.164	5.119	.586
		Error	670.616	26	25.793					
Abduction	1	Contrast	75.900	1	75.900	5.185	.031	.166	5.185	.592
		Error	380.626	26	14.639					
	2	Contrast	113.203	1	113.203	6.583	.016	.202	6.583	.695
		Error	447.084	26	17.196					
Ext_rot	1	Contrast	1.373	1	1.373	.153	.699	.006	.153	.066
		Error	233.264	26	8.972					
	2	Contrast	6.703	1	6.703	.634	.433	.024	.634	.120
		Error	274.786	26	10.569					
Int_rot	1	Contrast	5.058	1	5.058	.565	.459	.021	.565	.112
		Error	232.849	26	8.956					
	2	Contrast	15.156	1	15.156	1.532	.227	.056	1.532	.222
		Error	257.129	26	9.890					
CKCUT	1	Contrast	.321	1	.321	.092	.764	.004	.092	.060
		Error	90.643	26	3.486					
	2	Contrast	36.571	1	36.571	7.598	.011	.226	7.598	.756
		Error	125.143	26	4.813					
Pain	1	Contrast	.321	1	.321	.181	.674	.007	.181	.069
		Error	46.286	26	1.780					
	2	Contrast	10.020	1	10.020	13.998	.001	.350	13.998	.949
		Error	18.612	26	.716					
St_flexion	1	Contrast	28.000	1	28.000	.752	.394	.028	.752	.133
		Error	967.857	26	37.225					
	2	Contrast	170.036	1	170.036	4.690	.040	.153	4.690	.550
		Error	942.643	26	36.255					
St_Abd	1	Contrast	.893	1	.893	.025	.874	.001	.025	.053
		Error	912.071	26	35.080					
	2	Contrast	132.893	1	132.893	2.914	.100	.101	2.914	.376
		Error	1185.786	26	45.607					
St_ext_rot	1	Contrast	43.750	1	43.750	1.188	.286	.044	1.188	.183
		Error	957.214	26	36.816					
	2	Contrast	448.000	1	448.000	16.455	.000	.388	16.455	.974
		Error	707.857	26	27.225					
St_int_rot	1	Contrast	137.286	1	137.286	4.005	.056	.133	4.005	.487
		Error	891.143	26	34.275					
	2	Contrast	28.000	1	28.000	1.368	.253	.050	1.368	.203
		Error	532.000	26	20.462					

Each F tests the simple effects of Group within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.
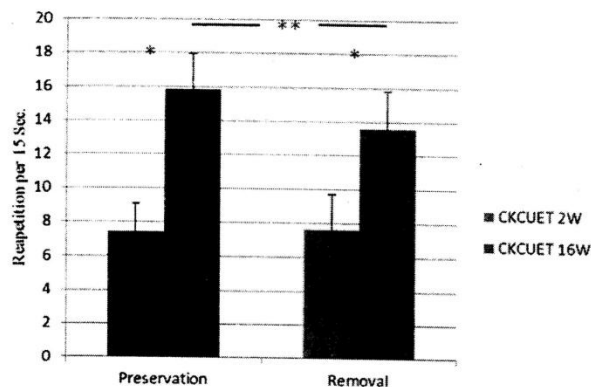
a. Computed using alpha = .05

Fig. (01) Closed Kinetic Chain Upper Extremity Test

* Indicate within group significance
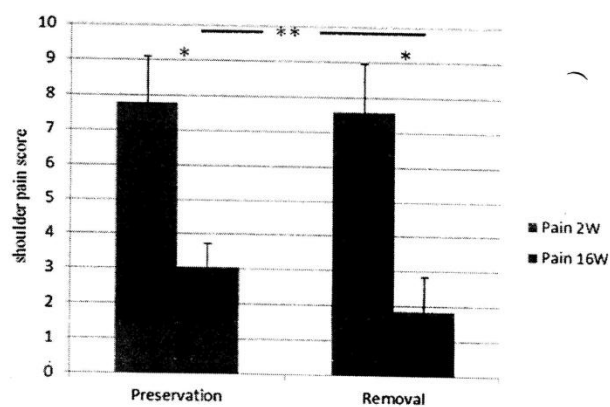** Indicate between group significance

Fig. (02): Pain

* Indicate within group significance

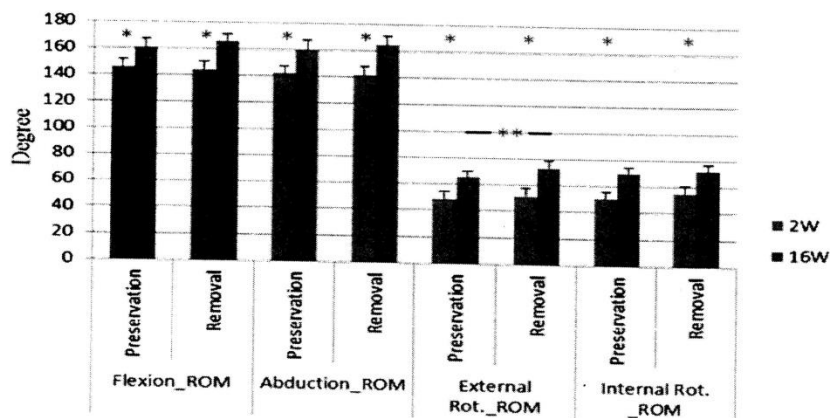** Indicate between group significance

Fig. (03) Range of Motion

*Indicate within group significance

** Indicate between group significance