

Arthroscopic Bankart Repair for Anterior Glenohumeral Instability in Adolescent Athletes: Risk Factors for Subsequent Revision Stabilization

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INTRODUCTION:

Adolescent athletes with a primary anterior glenohumeral dislocations have been shown to have a relatively high incidence of recurrent instability. Evolving evidence on this topic has led to increasing rates of arthroscopic stabilization over the last two decades. However, the timing and role of surgery following a single dislocation episode is one of the most controversial topics in orthopaedics. While arthroscopic stabilization is effective in allowing return to play, adolescents have higher rates of subsequent recurrent instability than any other age group. Identifying patients at highest risk of such events postoperatively may facilitate optimized surgical decision-making in this population. The purpose of this study was to identify prognostic factors that are associated with recurrent instability requiring reoperation following arthroscopic Bankart repairs in adolescents, with particular attention to the number of dislocations sustained prior to the index arthroscopic Bankart repair procedure.

METHODS:

All patients 12-21 years of age who had undergone arthroscopic Bankart repair surgery for anterior glenohumeral instability at a pediatric tertiary care hospital, performed by one of five different sports medicine fellowship-trained, high-volume shoulder instability surgeons, were included. The analysis was conducted using a multivariate Cox proportional hazards model, with percentage of patients with recurrent instability requiring a reoperation evaluated in a time-to-event analysis as the outcome. The effects from the Cox model were expressed as the hazard ratio (HR). All tests were 2-sided, with an alpha level of .05.

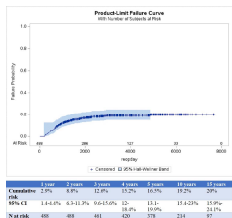
RESULTS:

A total of 488 adolescent patients (78% male; mean age: 16.9 +/-1.98 years) met study criteria, with the most common primary sports consisting of football (n=141, 29%), hockey (n=47, 10%), basketball (n=40, 8%), baseball (n=33, 7%), and lacrosse (n=30, 6%). A total of 270 (55%) athletes participated in contact sports, while 95 (20%) were overhead athletes. Overall, 86 patients (17.6%) required revision stabilization surgery for recurrent instability, with a cumulative risk of 8.8% at 2 years, 16.5% at 5 years, and 20% at 15 years. The revision stabilization procedures occurred at a mean +/- SD of 31.1 +/- 25.1 months from the index procedure and consisted of open Latarjet (n=42, 49%), revision arthroscopic stabilization (n=24, 28%), or open capsulorrhaphy (n=20, 23%). Risk factors for recurrent instability requiring revision stabilization included more than 1 dislocation episode prior to the index procedure (2 dislocations: HR=7.4 (2.5-21.6), p=0.0003; 3+ dislocations: HR=10.9 (3.9 to 30.5), p<0.0001), presence of a Hill-Sachs lesion (small Hill-Sachs: HR=2.5 (1.2-5.1), p=0.0114; medium-large Hill-Sachs: HR=4.2 (1.9-9.3), p=0.0004), younger age at the time of the index stabilization procedure (one year decrease in age: HR=1.2 (1.1-1.4), p=0.0015), and participation in contact sports (HR=1.8 (1.1-2.9), p=0.01). Adolescents who had sustained 1 dislocation prior to surgery had a cumulative incidence of revision surgery (3.2%) that was significantly lower than those who had sustained 2 dislocations (24.2%) or 3+ dislocations (33.5%).

DISCUSSION AND CONCLUSION:

The number of dislocation episodes prior to the index procedure was the strongest risk factor for recurrent instability requiring revision surgical stabilization following arthroscopic Bankart repair for adolescents with anterior glenohumeral instability, with two dislocation episodes conferring more than 7-fold increased risk compared to those who had just a single dislocation episode preoperatively. Other significant risk factors included the presence of a Hill-Sachs lesion, younger age, and participation in contact sports. These data support consideration for arthroscopic stabilization for adolescents following a single dislocation, especially in younger patients, contact athletes, or when a Hill Sachs lesion is present.

PRIMARY SPORTS PARTICIPATION



	No. Events (Number/Total)	Revision Stabilization n(%)	p-value from univariate analysis
Age at index stabilization (years)	173(35)	36(21)	p<0.0001
Gender	131(27)	48(36)	p=0.001
Female (%)	36(21)	18(37)	p=0.001
Female (n)	28(12)	16(33)	p=0.001
Number of dislocation episodes pre-index procedure (n)	141(29)	47(33)	p<0.0001
1	111(78)	4(4)	p<0.0001
2	121(85)	20(17)	p<0.0001
3+	12(9)	23(19)	p<0.0001
Hill-Sachs lesion	111(23)	31(28)	p<0.0001
Small	24(22)	17(39)	p<0.0001
Medium-Large	87(78)	14(14)	p<0.0001
Other	141(29)	45(32)	p<0.0001
Participation in contact sports	141(29)	45(32)	p=0.01
Overhead athletes	40(8)	12(12)	p=0.01
Non-contact	201(41)	33(16)	p=0.0001
Age at index stabilization (years)	16.9	16.9	p=0.0015
1 year decrease	1.2	1.2	p=0.0015

	Cumulative risk of recurrent instability requiring revision stabilization	95% C. confidence interval	N
Overall	20%	15.9%-24.1%	488
Number of dislocation episodes prior to index procedure			
One dislocation episode	3.2%	0.7%-6.3%	141
Two dislocation episodes	24.2%	15.6%-32.8%	111
Three or more dislocation episodes	33.5%	20%-47%	185
Presence of Hill-Sachs lesion			
No Hill-Sachs	8.8%	3%-14.6%	121
Small Hill-Sachs	21.8%	15.5%-27.1%	106
Medium-Large Hill-Sachs	32.0%	20.5%-44.5%	64
Participation in contact sports			
Does not participate in contact sports	14.2%	8.5%-19.9%	225
Participates in contact sports	25%	19.3%-30.7%	263
Statistical maturity			
Statistically mature	13.8%	9.3%-18.3%	321
Statistically immature	32.5%	24.3%-39.9%	166

	Hazard rate (95% CI)	P-value
Number of dislocation episodes before index procedure (vs 1 dislocation episode)	7.4 (2.5-21.6)	<0.0001
10	10.9 (3.9-30.5)	<0.0001
Presence of Hill-Sachs lesion (vs. no Hill-Sachs lesion)	2.5 (1.2-5.1)	<0.0114
Small	4.2 (1.9-9.3)	<0.0004
Medium to large	1.2 (1.1-1.4)	<0.0015
Age at index procedure (1 year decrease in age)	1.2 (1.1-1.4)	<0.0015
Contact sports	1.8 (1.1-2.9)	<0.01
Supports mature risk 95 days after first dislocation	2.7 (0.0-11.2)	0.18