



# Arthroscopic findings of traumatic first-time anterior shoulder instability: a comparison of adolescent versus adult patients

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**Background:** Recurrence rates after first-time shoulder dislocation in young patients are high, especially in their early teens. Only a few studies have arthroscopically investigated the inside of the glenohumeral joint in young patients. Such arthroscopic investigation would help in solving the cause of the greater incidence of recurrent instability in the young population, especially in their early teens.

**Methods:** Data from 42 patients with first-time anterior shoulder dislocation were retrospectively reviewed. The participants were divided into two groups: those aged 10 to 15 years at the time of the dislocation (adolescent group) and those aged 20–29 years (adult group). The arthroscopic findings regarding the glenohumeral joint in the adolescent group were assessed and compared to those in the adult group. The intra-articular pathology was examined in all cases and recorded with specific reference to (1) the anterior capsulolabral lesion, (2) Hill-Sachs lesion, (3) labrum-anteroinferior glenohumeral ligament complex, and (4) other concomitant lesions.

**Results:** Anterior joint laxity was found more in the adolescent group than in the adult group ( $P = .046$ ). Thirty-six (83%) shoulders had Hill-Sachs lesions: 6 shoulders (60%) in the adolescent group and 30 shoulders (97%) in the adult group, with a significant difference ( $P < .001$ ).

**Conclusion:** Pathological findings observed during arthroscopy are more common in the adult group, whereas recurrent instability is more likely in adolescent group.

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Treatment for first-time shoulder dislocation remains controversial, especially in young patients, because recurrence rates are high in young patients.<sup>3,18</sup> Recent clinical research<sup>10,15,24</sup> has shown that immobilization in the external rotation significantly decreased the risk of recurrent instability. On the other hand, the other recent work has shown that immobilization in external rotation, does not significantly decrease the risk of recurrent instability in the young, athletic population.<sup>13</sup> Especially, first-time dislocation in teenagers is known to lead to high recurrence rates.<sup>1,4</sup> Therefore, some surgeons recommend surgical treatment for the young population with a high recurrence rate.<sup>16</sup> Arthroscopic Bankart repair is the gold standard procedure for patients with anterior shoulder dislocation. The indication for patients with first-time dislocation remains controversial. The clinical results of young patients, especially those in their early teens have been reported to be inferior to those of adult patients. Although the inside of the glenohumeral

joint can be observed in detail during surgery, few studies have arthroscopically investigated the inside of the glenohumeral joint among young patients with first-time shoulder dislocation<sup>7,22</sup>; to the best of our knowledge, there have been no reports for patients in their early teens. Therefore, we aimed to arthroscopically investigate the inside of the glenohumeral joint, which will help in solving the cause of the shift to the recurrence in the young population, especially those in their early teens. The purpose of this study was hence to investigate the arthroscopic findings of the inside of the glenohumeral joint among patients in their early teens who have had traumatic first-time shoulder instability and to compare the arthroscopic findings between patients in their early teens and adult patients.

## Patients and methods

For the patients with first-time anterior shoulder dislocation who visited our hospital, we recommend surgery. Some patients chose nonsurgical treatment and were not included in this study. Data from 42 patients who met the following inclusion criteria were retrospectively reviewed: (1) those with first-time anterior shoulder dislocation, (2) the episode was caused by a traumatic

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**Table 1**

	Adolescent group	Adult group	P value
Patients, n	11	31	
Age, mean (range), y	14.7 (14-15)	22.7 (20-28)	<.001
Sex, n			
Male/Female	6/5	5/26	
Dislocation/subluxation	7/4	25/6	.269
Mean interval between dislocation and arthroscopic examination			.437
<1 mo	5	10	
>1 mo (range)	6 (1-11)	21 (1-42)	
Immobilization			
Yes/No	3/8	20/11	.032

event, and (3) those who underwent arthroscopic examination. The exclusion criteria were as follows: (1) those with voluntary shoulder dislocation, (2) those with full-thickness rotator cuff tears, (3) those with multidirectional instability defined as symptomatic instability in two or more directions or joint laxity in three directions, and (4) those with previous shoulder surgery. The participants were divided into two groups: those aged 10–15 years at the time of the dislocation (adolescent group) and those aged 20–29 years (adult group). There were 56 patients of an age between the two groups (age 15–20 years), which were not counted in this study. The adolescent group was composed of 6 male and 5 female patients with an average age of 15 years at the time of surgery. The adult group was composed of 5 male and 26 female patients with an average age of 23 years at the time of surgery. Dislocation was defined as an instability episode resulting in complete dislocation that requires manual reduction. Subluxation was defined as the subjective history of the shoulder “slipping or popping out” or pain and apprehension. The mean interval between dislocation and arthroscopic examination was  $55 \pm 74$  days, and the interval within one month accounted for 36% (15 shoulders) of all shoulders examined (Table 1). After reduction, three shoulders (27%) in the adolescent group and 20 shoulders (65%) in the adult group were immobilized in internal rotation for 3 weeks. Positive general joint laxity was defined as when the patient had more than four out of six joint laxity signs according to the modified Carter and Wilkinson joint laxity.<sup>5</sup> The present study was approved by the Institutional Review Board of our hospital (#0064).

### Surgical techniques

All operations were performed by a single surgeon (K.O.) and with the patient under general anesthesia. Arthroscopic examination was performed with the patient in the lateral decubitus position and the arm was then suspended in 45° of abduction and longitudinal traction. A standard posterior portal was created approximately 2 cm medial and 2 cm distal to the acromial angle. After the inspection of the glenohumeral joint, two portals (anterior and anterolateral) were established.

### Arthroscopic examination

All measurements during surgery were performed by a single surgeon. Evaluation under anesthesia was not performed to avoid secondary damage to the glenohumeral joint. Arthroscopy of the glenohumeral joint was performed via a standard posterior portal with a 30° 4-mm arthroscope. With a fluid management system, a pressure of 40–60 mmHg was maintained throughout the entire procedure. In some cases, an anterior portal was also used for probing, débridement, and removing osteochondral fragments. The intraarticular lesion was examined in all cases and recorded with

specific reference to the (1) anterior capsulolabral lesion, (2) Hill-Sachs lesion, (3) labrum-anteroinferior glenohumeral ligament complex (labrum-AIGHL complex), and (4) other concomitant lesions. Also, shoulder joint laxity testing was performed during the arthroscopy examination using a modified Hawkins classification as previously described.<sup>8</sup> When the anterior labrum was observably detached from the glenoid, its extent was recorded. The extent of the detached labrum was expressed as times on the clock face (eg, from 12:00 to 3:00). Lesion size was classified as small (<2 hours), medium (2–4 hours), and large (>4 hours) (Fig. 1). The displacement of the labrum-AIGHL complex was also measured using the probe with the scale. The medial displacement was measured from the glenoid edge and was defined as positive medial displacement when the displacement was >5 mm. Because a biomechanical study by Yamamoto et al<sup>23</sup> showed the shoulder became unstable after scapular neck-5 mm fixation (on the scapular neck 5 mm from the glenoid rim) compared with the glenoid rim fixation. Regarding the inferior displacement of the labrum-AIGHL complex, the distance from the detached position of the labrum-AIGHL complex to the reduced one was also measured. When this was >5 mm, it was defined as positive inferior displacement after the labrum-AIGHL complex was mobilized and shifted superiorly as possible, which was assumed to be its original attachment site (Fig. 2). Hill-Sachs lesions were classified according to Rowe's classification<sup>18</sup>: mild, moderate, and large lesions (Fig. 3).

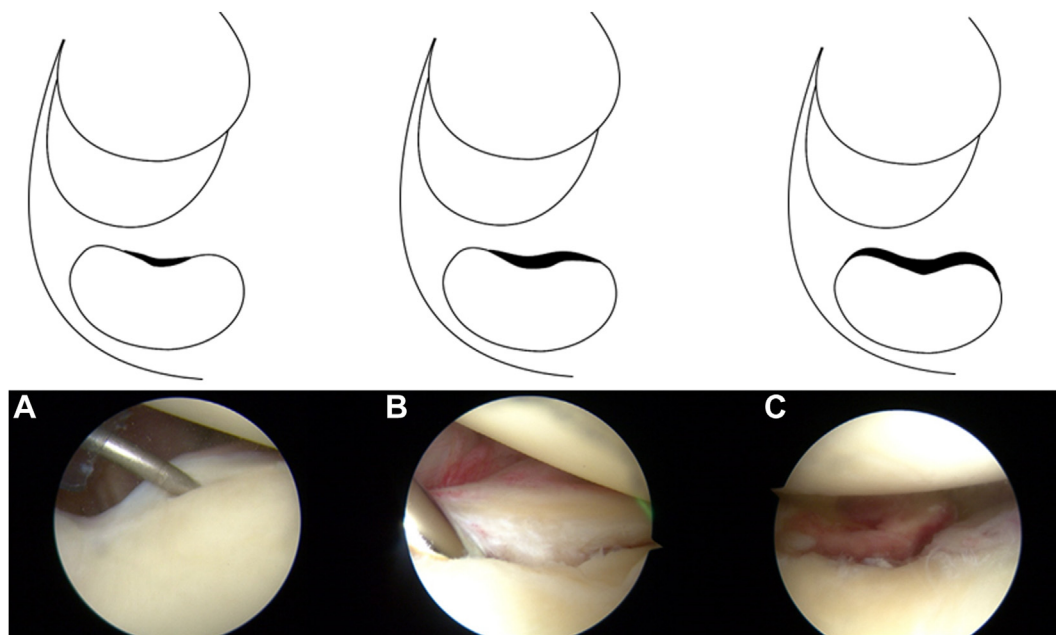
The concomitant lesions included the superior labrum anteroposterior lesion<sup>20</sup> and the bony Bankart lesion. At the time of arthroscopy, the shoulders were examined for shoulder joint laxity with the patient in a lateral decubitus position without traction. Anterior, posterior, and inferior laxities were graded using a modified Hawkins classification as previously described.<sup>8</sup> The amount of translation in each direction was graded as 1+, 2+, and 3+. The translation was graded as 1+ when the humeral head was translated up to the glenoid rim (20%–50% translation of the humeral head diameter). Clearly increased translation was graded as 2+ when the humeral head was translated up to the glenoid rim (>50% translation of the humeral head diameter), and 3+ when the humeral head was translated over the glenoid rim (Fig. 4). We defined it as positive joint laxity when more than grade 2 was observed.

Statistical analysis was performed using a standard statistics package (SPSS for Windows 1997; SPSS, Inc., Chicago, IL, USA). The Fisher exact test was used to determine the statistical significance between the adolescent and adult groups. Significance was set at  $P < .05$ .

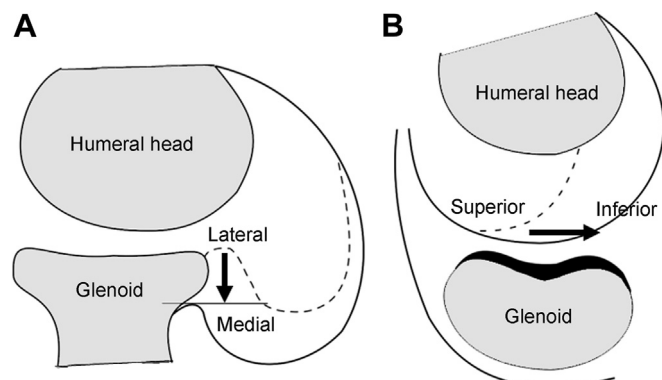
### Results

According to the modified Carter and Wilkinson joint laxity,<sup>5</sup> five shoulders (50%) had positive general joint laxity in the adolescent group compared to the seven (23%) in the adult group, which was significantly lower ( $P < .005$ ). The causes of dislocation were injuries during sports activity (11 shoulders [100%] in the adolescent group and 19 shoulders [61%] in the adult group), falling (zero shoulder [0%] in the adolescent group and four shoulders [13%] in the adult group), and others (one shoulders in the adolescent group and three shoulders [10%] in the adult group). However, there was no significant difference between the two groups (Table II).

The arthroscopic findings are presented in Table III. In 39 out of 42 (93%) shoulders, the Bankart lesion could not get coaptation with the anatomic reduction of separation and displacement of the anteroinferior portion of the labrum: 10 shoulders (91%) in the adolescent group and 29 shoulders (94%) in the adult group, without statistical significance. All 5 patients in the adolescent



**Figure 1** The extent of the detached labrum. (A) Small (less than 2 hours). The extent of the detached labrum was expressed as times on the clock face. (B) Medium (2- 4 hours). (C) Large (more than 4 hours).



**Figure 2** Medial and inferior displacement of the labrum. (A) Medial displacement. The labrum was displaced more than 5 mm medially. (B) Inferior displacement. The labrum was displaced more than 5 mm inferiorly.

group who had no Hill-Sachs lesion had positive anterior drawer test.

The extent of the detached labrum in the adolescent and adult groups was two (18%) and two (6%) shoulders in small, eight (73%) and 15 (48%) shoulders in medium, and zero (0%) and 12 (39%) shoulders in large, respectively. No labrum detachment was observed in one shoulder (9%) in the adolescent group and two shoulders (3%) in the adult group. The inferior or medial displacement of the labrum was observed in 29 shoulders (67%) in total: six shoulders (55%) in the adolescent group and 29 shoulders (85%) in the adult group. Among shoulders with a displaced labrum, inferior displacement was observed in zero shoulder (0%) in the adolescent group and 6 shoulders (19%) in the adult group. Furthermore, medial displacement was observed in one shoulder (9%) in the adolescent group and one shoulder (3%) in the adult group (Table III).

Thirty-six (86%) shoulders had Hill-Sachs lesions: six shoulders (55%) in the adolescent group and 30 shoulders (97%) in the adult

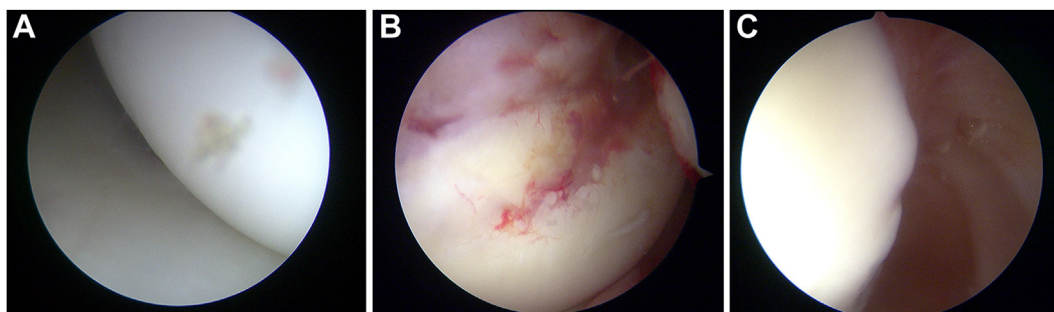
group, with a significant difference ( $P < .001$ ). There were six (14%) superior labrum anteroposterior lesions: five shoulders (12%) were classified as type 2 (adult group) and one as type 3 (adult group) according to the classification of Snyder et al<sup>20</sup> with a significant difference between the two groups ( $P = .046$ ). There were four (10%) bony Bankart lesions: one shoulder in the adolescent group and three shoulders in the adult group, with no significant difference between the two groups. Only one shoulder in the adult group had tears on the capsule at the humeral insertion.

From arthroscopic evaluations, there were 36 shoulders (86%) with positive anterior joint laxity: 11 shoulders (100%) in the adolescent group and 25 shoulders (81%) in the adult group, which was significantly higher ( $P < .046$ ) (Table IV).

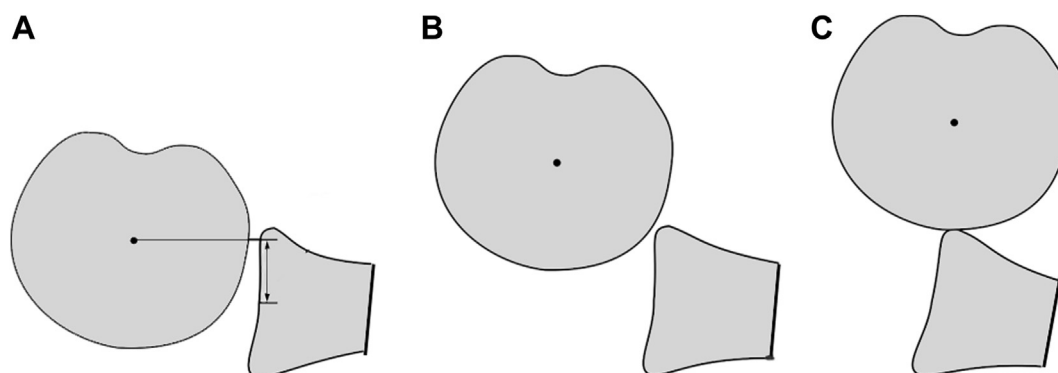
### Discussions

Our data indicated that the anterior labrum remained unattached to the glenoid in 39 out of 42 (93%) without any significant difference between the adolescent and adult groups. The previous clinical study<sup>2</sup> also reported that the labrum-AIGHL complex was not attached in 19 of 31 shoulders (61%). This may indicate the failure of an anterior stabilizing mechanism inside the joint remaining unrepaired after the first-time dislocation in both the adolescent and adult groups. However, since the interval between dislocation and arthroscopic examination was within one month in some shoulders, we were not able to conclude that it remained unrepaired. However, there was a smaller extent and displacement in the adolescent group than in the adult group. Moreover, half of the cases within the adolescent group had no displacement of the labrum despite the avulsion from the glenoid. Presumably, external force is absorbed by the soft tissues except for the labrum because of greater joint laxity in adolescent patients compared to adults. Furthermore, Hill-Sachs lesions were smaller in the adolescent group compared to the adult group, which could also be explained by the greater joint laxity among adolescents.

Cordischi et al<sup>6</sup> investigated the clinical outcomes of nonoperative treatment in 14 patients (age range: 10-13 years) who sustained a first-time anterior traumatic shoulder dislocation. They



**Figure 3** Hill-Sachs lesions were classified according to Rowe's classification: mild, moderate, and large lesions. (A) Small. (B) Medium. (C) Large.



**Figure 4** General joint laxity (modified Hawkins classification). (A) Grade 1. The humeral head was translated up to the glenoid rim (20%-50% translation of the humeral head diameter). (B) Grade 2. The humeral head was translated up to the glenoid rim (more than 50% translation of the humeral head diameter). (C) Grade 3. The humeral head was translated over the glenoid rim.

**Table II**  
Causes of dislocation.

	Adolescent group	Adult group	P value
A. Sports injury	10	19	.049
1) Contact sports	5	3	.014
Judo	2	0	
Karate	1	0	
American football	0	2	
Ice hockey	0	1	
Basketball	2	0	
2) Fell down during play	0	6	.046
Snow board	0	4	
Ski	0	2	
3) Throwing sports	0	2	.264
Baseball	0	1	
Volleyball	0	1	
4) Others	0	3	
B. Fell down	0	4	.109
C. Others	0	1	

reported that three patients (21.4%) ultimately sustained a recurrent shoulder dislocation and concluded that in the pediatric skeletally immature patient who sustained a first-time, traumatic, anterior shoulder dislocation, nonoperative treatment results in low shoulder instability recurrence risk. However, our data showed that the anterior labrum remained unattached to the glenoid and unhealed in 10 shoulders (91%) of patients in the adolescent group. Of them, 5 shoulders (45%) had no displacement of the labrum. Therefore, there was a possibility that the labrum could be repaired by nonoperative treatment; nevertheless, this is only a small possibility considering that the period from the injury to the

arthroscopic examination was more than one month. The period from the injury to the arthroscopic examination was more than one month in 5 shoulders (45%) in the adolescent group, whereas 10 shoulders (32%) in the adult group. This is because adolescent patients were not likely to come to the hospital soon. This difference may have affected the results.

Recent work investigating the clinical results treated with immobilization in external rotation demonstrated that it did not significantly decrease the risk of recurrent instability in the young, athletic population.<sup>13</sup> Especially, first-time dislocation in teenagers has been reported to lead to high recurrence rates.<sup>14</sup> Robinson et al<sup>17</sup> performed a prospective cohort study of 252 patients aged 15- 35 year old who sustained an anterior shoulder dislocation and were treated with sling immobilization. They reported that instability developed in 55.7% of the shoulders within the first 2 years after the first-time dislocation and increased to 66.8% by the fifth year. Hoelen et al<sup>9</sup> also investigated the clinical results of 168 shoulder dislocations at follow-up an average of 4 years after nonsurgical treatment. They reported that the highest recurrence rate was found in patients ≤30 years. Shin et al<sup>19</sup> compared the frequency of intra-articular lesions between young patients with first-time shoulder dislocations and those with recurrent shoulder dislocations. They described that primary arthroscopic stabilization can be considered one of the treatment options in patients <30 years with first-time shoulder dislocation.

Previous studies<sup>11,12</sup> demonstrated that the Bankart lesion was reduced with the arm in external rotation. However, there are several reports demonstrating that external rotation immobilization did not reduce the recurrence rate after primary shoulder dislocation as compared with internal rotation immobilization.<sup>14,15</sup> Tanaka et al<sup>21</sup> reported that highly active young men with

**Table III**  
Arthroscopic findings.

	Adolescent group	Adult group	P value
Labrum detachment	10	29	.776
Small	2	2	
Medium	8	15	
Large	0	12	
No detachment	1	2	
Labrum displacement	6	23	.235
Inferior	0	6	
Medial	1	1	
Medio-inferior	5	16	
No displacement	5	8	
Hill-Sachs lesion	6	30	<.001
Small	3	8	
Medium	2	9	
Large	1	13	
Concomitant lesions			
SLAP lesion	0	6	.046
Bony Bankart lesion	1	3	.954
HAGL lesion	0	1	

SLAP, superior labrum anterior and posterior; HAGL, humeral avulsion of glenohumeral ligament.

**Table IV**  
Shoulder joint laxity.

	Adolescent group	Adult group	P value
Shoulder joint laxity*			
Anterior	11	25	.046
Inferior	4	11	.958
Posterior	1	3	.954

\*We defined as positive joint laxity when more than grade 2 was observed according to a modified Hawkins classification.<sup>12</sup>

traumatic primary anterior shoulder dislocation were treated using 3-week external rotation immobilization and high recurrence was observed.

There are several limitations to this study. First, this is a retrospective study with a small number of participants. It was not easy to increase the number of participants with first-time dislocation, especially early teens. Second, only the patients with any symptoms such as feelings of instability or pain were included in this study. The patients who chose nonsurgical treatment were excluded. Since we did not collect the clinical or radiological data of the patients who did not have surgery, this study may have selection bias. Third, although there were no significant differences of the number of contact athletes and patients with dislocations and subluxations between two groups, there was a significant difference of general joint laxity. Also, there were no data of the time to reduction in this study. These factors may be related to the pathologic findings.

**Conclusion**

Among patients aged <15 years with traumatic first-time anterior shoulder instability, the labrum detachment and Hill-Sachs lesion were less severe compared to adults. Pathological findings observed during arthroscopy are more common in the adult group, whereas recurrent instability is more likely in adolescent group.

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**References**

- Arciero RA, Wheeler JH, Ryan JB, McBride JT. Arthroscopic Bankart repair versus nonoperative treatment for acute initial anterior shoulder dislocations. *Am J Sports Med* 1994;22:589-94.
- Baker CL, Uribe JW, Whitman C. Arthroscopic evaluation of acute initial anterior shoulder dislocations. *Am J Sports Med* 1990;18:25-8.
- Bankart AS. Recurrent or habitual dislocation of the shoulder. *Br Med J* 1923;2:1132-3.
- Bottoni CR, Wilckens JH, DeBerardino TM, D'Alleyrand JC, Rooney RC, Harpstrite JK, et al. A prospective randomized evaluation of arthroscopic stabilization versus nonoperative treatment in patients with acute traumatic first-time shoulder dislocations. *Am J Sports Med* 2002;30:576-80. <https://doi.org/10.1177/03635465020300041801>.
- Carter C, Wilkinson J. Persistent joint laxity and congenital dislocation of the hip. *J Bone Joint Surg Br* 1964;46:40-5.
- Cordischi K, Li X, Busconi B. Intermediate outcomes after primary traumatic anterior shoulder dislocation in skeletally immature patients age 10-13 years. *Orthopedics* 2009;32:686-90. <https://doi.org/10.3928/01477447-20090728-34>.
- Grumet RC, Bach BR Jr, Provencher MT. Arthroscopic stabilization for first-time versus recurrent shoulder instability. *Arthroscopy* 2010;26:239-48. <https://doi.org/10.1016/j.arthro.2009.06.006>.
- Hawkins RJ, Mohtadi N. Clinical evaluation of shoulder instability. *Clin J Sport Med* 1991;1:59-64.
- Hoelen MA, Burgers AM, Rozing PM. Prognosis of primary anterior shoulder dislocation in young adults. *Arch Orthop Traum Surg* 1990;110:51-4.
- Hurley ET, Fried JW, Alaia MJ, Strauss EJ, Jazrawi LM, Matache BA. Immobilization in external rotation after first-time traumatic anterior shoulder instability reduces recurrent instability: a meta-analysis. *J ISAKOS* 2021;6:22-7. <https://doi.org/10.1136/jisakos-2020-000511>.
- Itoi E, Hatakeyama Y, Kido T, Sato T, Minagawa H, Wakabayashi I, et al. A new method of immobilization after traumatic anterior dislocation of the shoulder. *J Shoulder Elbow Surg* 2003;12:413-5. [https://doi.org/10.1016/s1058-2746\(03\)00171-x](https://doi.org/10.1016/s1058-2746(03)00171-x).
- Itoi E, Hatakeyama Y, Sato T, Kido T, Minagawa H, Yamamoto N, et al. Immobilization in external rotation after shoulder dislocation reduces the risk of recurrence. *J Bone Joint Surg Am* 2007;89-A:2124-31. <https://doi.org/10.2106/JBJS.F.00654>.
- Kane P, Bifano SM, Dodson CC, Freedman KB. Approach to the treatment of primary anterior shoulder dislocation: a review. *Phys Sportsmed* 2015;43:54-64. <https://doi.org/10.1080/00913847.2015.1001713>.
- Liavaag S, Stiris MG, Lindland ES, Enger M, Svenningsen S, Brox JI. Do Bankart lesions heal better in shoulders immobilized in external rotation? *Acta Orthop* 2009;80:579-84. <https://doi.org/10.3109/17453670903278266>.
- Murray JC, Leclerc A, Balatri A, Pelet S. Immobilization in external rotation after primary shoulder dislocation reduces the risk of recurrence in young patients. A randomized controlled trial. *Orthop Traumatol Surg Res* 2020;106:217-22. <https://doi.org/10.1016/j.otsr.2018.10.007>.
- Roberts SB, Beattie N, McNive ND, Robinson CM. The natural history of primary anterior dislocation of the glenohumeral joint in adolescence. *Bone Joint J* 2015;97-B:520-6. <https://doi.org/10.1302/0301-620X.97B4.34989>.
- Robinson CM, Howes J, Murdoch H, Will E, Graham C. Functional outcome and risk of recurrent instability after primary traumatic anterior shoulder dislocation in young patients. *J Bone Joint Surg Am* 2006;88-A:2326-36. <https://doi.org/10.2106/JBJS.E.01327>.
- Rowe CR. Prognosis in dislocations of the shoulder. *J Bone Joint Surg Am* 1956;38:957-77.
- Shin S, Ko Y, Lee J. Intra-articular lesion and their relation to arthroscopic stabilization failure in young patients with first-time and recurrent shoulder dislocations. *J Shoulder Elbow Surg* 2016;25:1756-63. <https://doi.org/10.1016/j.jse.2016.03.002>.
- Snyder SJ, Karzel RP, Del Pizzo W, Ferkel RD, Friedman MJ. SLAP lesions of the shoulder. *Arthroscopy* 1990;6:274-9.
- Tanaka Y, Okamura K, Imai T. Effectiveness of external rotation immobilization in highly active young men with traumatic primary anterior shoulder dislocation or subluxation. Feature article. *Orthopedics* 2010;33:670. <https://doi.org/10.3928/01477447-20100722-07>.
- Taylor DC, Arciero RA. Pathologic changes associated with shoulder dislocations. Arthroscopic and physical examination findings in first-time, traumatic anterior dislocations. *Am J Sports Med* 1997;25:306-11.
- Yamamoto N, Muraki T, Sperling JW, Steinmann SP, Itoi E, Cofield RH, et al. Does the "bumper" created during Bankart repair contribute to shoulder stability? *J Shoulder Elbow Surg* 2013;22:828-34. <https://doi.org/10.1016/j.jse.2012.08.010>.
- Zhang B, Sun Y, Liang L, Yu X, Zhu L, Chen S, et al. Immobilization in external rotation versus internal rotation after shoulder dislocation: a meta-analysis of randomized controlled trials. *Orthop Traumatol Surg Res* 2020;106:671-80. <https://doi.org/10.1016/j.otsr.2020.03.011>.