

# Evaluation of long-term clinical and radiographic outcomes of arthroscopic Bankart repair: a five-year retrospective study

 Recep Taşkın<sup>1</sup>,  Mehmet Köse<sup>2</sup>

<sup>1</sup>Department of Orthopedics and Traumatology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye

<sup>2</sup>Department of Orthopedics and Traumatology, Medical Park Bahçelievler Hospital, İstanbul, Türkiye

**Cite this article as:** Taşkın R, Köse M. Evaluation of long-term clinical and radiographic outcomes of arthroscopic Bankart repair: a five-year retrospective study. *Kastamonu Med J.* 2025;5(1):60-65.

Received: 28.11.2024

Accepted: 22.01.2025

Published: 04.03.2025

## ABSTRACT

**Aims:** This study examined the clinical and radiographic results of individuals following arthroscopic Bankart shoulder stabilization over a minimum of five years. Additionally, methodological quality and bias evaluations were conducted to enhance the study's scientific legitimacy.

**Methods:** A retrospective analysis was conducted on 103 individuals who had arthroscopic Bankart repair between 2010 and 2015. A history of anterior shoulder dislocation and a minimum 5-year follow-up time were prerequisites for inclusion. The chi-square test was used to examine the clinical and radiographic data, and a significance level of  $p < 0.05$  was approved.

**Results:** Radiographic assessments revealed normal results, and 80.58% of individuals had excellent clinical outcomes. Subluxation occurred in 7.77% of cases, while recurrent dislocation was observed in 11.65%. The results showed that the right side performed better than the left.

**Conclusion:** Following arthroscopic Bankart surgery, low recurrence rates and good patient satisfaction were noted. Gender and side differences, however, highlight the significance of tailored treatment strategies among functional outcomes.

**Keywords:** Shoulder dislocation, joint instability, arthroscopy, Bankart lesion, clinical study

## INTRODUCTION

The shoulder joint is predominantly supported by the glenohumeral articulation, which facilitates the majority of the joint's range of motion. Nonetheless, this range of motion is counterbalanced by the intricate interplay of anatomical components that confer both passive and active stabilization. An alteration of this equilibrium, favoring enhanced mobility, may clinically present as a dislocation of the glenohumeral joint.<sup>1</sup> Approximately fifty percent of all substantial joint dislocations are attributable to dislocations of the glenohumeral joint, thereby constituting a considerable clinical concern.<sup>2</sup>

Shoulder instability can be categorized in various manners based on the direction of motion, with anterior dislocation being the most prevalent form. Additionally, posterior, inferior, superior, and multidirectional instabilities have been documented in the literature. It has been estimated that approximately 80-90% of anterior shoulder dislocations result from traumatic incidents, typically initiated by an excessive force exerted on the shoulder during abduction and external rotation.<sup>3,4</sup> The prevalence of traumatic anterior glenohumeral instability within the general populace has been recorded to be around 1.7%.<sup>5</sup> Such traumatic occurrences lead to damage in

soft tissues or osseous structures that are integral to shoulder stability, thereby heightening the probability of subsequent dislocations.

In the initial occurrence of a shoulder dislocation, the implementation of closed reduction is feasible subsequent to a meticulous physical examination and an adequate radiographic assessment. In instances where closed reduction proves ineffective, the necessity for open reduction arises. Throughout the therapeutic process, it is imperative to consider that the existence of osseous or soft tissue injuries may influence both the therapeutic approach and the subsequent healing trajectory.

Currently, shoulder arthroscopy is widely recognized as a valid approach for addressing a variety of shoulder pathologies. Due to significant technological advancements in recent years, coupled with an enhancement in the proficiency of surgeons, the range of shoulder injuries amenable to arthroscopic intervention has considerably broadened. Arthroscopic intervention is frequently favored over traditional open surgery owing to its facilitation of expedited rehabilitation, reduced tissue trauma, and superior aesthetic outcomes.<sup>6,7</sup>

**Corresponding Author:** Recep Taşkın, rtaskin@kastamonu.edu.tr



Despite the considerable prevalence of anterior shoulder dislocations, long-term follow-up studies involving large patient cohorts are quite limited. The majority of research on the long-term outcomes of both open and arthroscopic Bankart procedures includes only small patient populations. This makes it challenging to accurately assess the true incidence of complications following surgical intervention. Moreover, the ambiguous definitions of the terminologies recurrent instability, dislocation, and subluxation found within the academic literature further obstruct the evaluation of outcomes. In light of this situation, there exists a pressing need for studies that critically assess the methodological rigor of long-term outcome research.

The objective of the study was to investigate the long-term clinical and radiographic results over a minimum duration of five years in patients who underwent arthroscopic Bankart shoulder stabilization. Additionally, assessments of methodological quality and potential biases were conducted to enhance the scientific validity of the research. It was posited in this investigation that there would be low rates of redislocation, superior clinical outcomes when compared to the preoperative state, and minimal radiographic evidence of glenohumeral arthritis.

## METHODS

This retrospective study, approved by the Atatürk University Faculty of Medicine Clinical Researches Ethics Committee (Date: 01.10.2020, Decision No: 05), evaluated 103 patients who were hospitalized in the Department of Orthopedics and Traumatology at Atatürk University Faculty of Medicine between January 1, 2010, and November 15, 2015, due to shoulder instability and subsequently underwent arthroscopic surgical intervention. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The data collected were subjected to analysis utilizing the chi-square test. The chi-square test ( $X^2$ ) serves as a statistical methodology employed to assess the significance of the variance between observed frequencies and anticipated frequencies. This particular test is typically employed for the following objectives:<sup>8</sup>

- Independence test; to evaluate the independence of two categorical variables.
- Goodness of fit test; to examine the extent to which a data set conforms to a specified distribution.

### Inclusion Criteria

The parameters for inclusion were delineated in the following manner:

- Individuals possessing a preoperative history characterized by anterior shoulder dislocation accompanied by manifestations indicative of anterior shoulder instability,
- Individuals experiencing persistent symptoms or recurrent dislocations despite the implementation of conservative management strategies and immobilization techniques,
- Individuals who received minimum of five years post-surgery,
- Individuals who have undergone an arthroscopic anatomical Bankart repair utilizing suture anchors,

- Individuals possessing comprehensive documentation of preoperative assessments (including shoulder MRI and X-Ray), measurements of range of motion (ROM), examination results, and clinical scoring metrics (UCLA, Rowe, Constant),
- Individuals with Hill-Sachs lesions comprising less than 30% of the humeral head and minimal concomitant superior labrum pathology.

### Exclusion Criteria

The parameters for exclusion criteria are articulated as follows:

- Individuals exhibiting Hill-Sachs lesions exceeding 30% in severity,
- Individuals who are below the age of 18 or above the age of 60,
- Individuals who declined participation in the research study or failed to attend follow-up assessments,
- Individuals possessing a documented history of multidirectional instability or instances of posterior dislocation,
- Individuals characterized by glenoid bone defects or bony Bankart lesions,
- Individuals with absent preoperative imaging as well as examination data.

Every surgical surgery in the study was carried out by a skilled surgeon using a standardized technique. Clinical scoring (UCLA, Rowe, Constant) was used to assess the patients' functional status over the course of their long-term follow-up, and the final control values were examined. Recurrent shoulder dislocations, any sense of subluxation, the inability to resume full activity, and the requirement for more stabilizing procedures were all considered signs of treatment failure. The UCLA shoulder score (University of California at Los Angeles), the Rowe score, and the Constant-Murley score are widely used clinical tools for assessing shoulder function, particularly following injuries or surgical interventions. The UCLA score evaluates pain, function, active forward flexion, strength, and patient satisfaction, with a total score of 35 points, where higher scores indicate better shoulder function.

The Rowe score is primarily used for assessing shoulder stability, motion, and function after stabilization procedures, scoring up to 100 points and categorizing outcomes as excellent, good, fair, or poor.

The Constant-Murley score incorporates both subjective factors, such as pain and activities of daily living, and objective measures, including range of motion and strength, to provide a comprehensive evaluation of shoulder function, with a maximum score of 100 points. These scoring systems are valued for their reliability and standardization, enabling effective comparison of outcomes across studies and patient populations.

### Surgical Technique

All surgical interventions were conducted by a seasoned surgeon employing a standardized procedural technique. Patients underwent the operation under general anesthesia while positioned in the "beach-chair" orientation. Throughout the surgical process, posterior, anterior, and anterosuperior portals were established, allowing for a comprehensive

evaluation of the joint. The damaged labrum was excised, scar tissue was meticulously removed, and the anterior aspect of the glenoid was debrided to facilitate the formation of a bleeding surface. Absorbable screws integrated with suture anchors were utilized to realign the labrum to its original anatomical configuration. Typically, the initial anchor was positioned at the 5 o'clock location, followed by the placement of additional anchors in designated positions to guarantee the stability of the capsular tissues. During this intervention, particular attention was given to achieving the appropriate tension and alignment of the capsule and labrum.

### Postoperative Rehabilitation

In the postoperative phase, patients were provided with a shoulder sling that ensured immobilization in adduction and internal rotation for the initial three weeks. During this interval, it was recommended that patients engage in gentle exercises encompassing elbow, wrist, and hand movements. Commencement of pendulum exercises and active assisted movements was initiated from the third week, with active exercises aimed at achieving full range of motion beginning at the sixth week. Light resistance training was introduced by the third month, and patients were permitted to resume full activities, including contact sports, by the sixth month. This meticulously structured rehabilitation regimen was formulated to facilitate functional recovery while concurrently minimizing the likelihood of recurrent instability.

### Statistical Analysis

Numerical data were presented as mean and standard deviation in descriptive statistics, whereas numbers and percentages were used to represent categorical data. The chi-square test was used to assess categorical data. In statistical analysis,  $p < 0.05$  was considered the significance threshold. The analysis was conducted by utilizing the SPSS 23.0 package.

## RESULTS

The long-term effects of treating shoulder instability following arthroscopic surgery were assessed in this study. Based on variables including gender, side, and clinical evaluation results, the participants' demographic and clinical features were thoroughly examined. The findings offer thorough information for assessing middle-aged people's health. The participants' diverse age range and the in-depth analysis of gender and side disparities offer a crucial foundation for comprehending how individual characteristics impact treatment procedures. These findings offer a useful framework for evaluating the success of treatment procedures and the efficacy of long-term follow-up. **Table 1** provides a comprehensive analysis of the data collected for the study.

According to **Table 1**, the participants' average age was 37.90 years, and their average follow-up duration was 76.89 months.

	Mean	SD	Median	Min	Max
Age	37.90	10.21	39.00	23.00	57.00
Follow-up period (months)	76.89	12.62	72.00	60.00	108.00

SD: Standard deviation, Min: Minimum, Max: Maximum

This offers a crucial foundation for tracking the middle-aged population's health and treatment procedures. The large age

range of 23 to 57 years illustrates the variety of people's health requirements and possible reactions to therapy. Furthermore, the fact that the follow-up length ranges from 60 to 108 months suggests that long-term follow-up is possible, but individual variances should be considered when extrapolating the research's findings. **Table 2** shows the gender, side, and last follow-up evaluation results of the participants.

	n	%
Gender	Female	17 16.50
	Male	86 83.50
Side	Right	48 46.60
	Left	55 53.40
Last follow-up CMS (0-100)	0-70: Poor	0 .00
	70-79: Fair	12 11.65
	80-89: Good	8 7.77
Last follow-up UCLA	90-100: Excellent	83 80.58
	0-25: Poor	12 11.65
	25-33: Good	11 10.68
Last follow-up rowe	34-35: Excellent	80 77.67
	Very good (90-100 points)	80 77.67
	Good (75-89 points)	0 .00
Last follow-up plain radiograph findings	Fair (51-74 points)	11 10.68
	Poor (50 points and below)	12 11.65
	Normal	83 80.58
Dislocation or subluxation not dislocated	Mild 3 mm<	8 7.77
	Moderate 3-7 mm	12 11.65
	Severe >7 mm	0 .00
UCLA: University of California at Los Angeles	Not dislocated	83 80.58
	Dislocated	12 11.65
	Subluxated	8 7.77

The following headers appear when **Table 2** is examined.

**Distribution of gender:** 83.50% of participants were men and 16.50% were women. This indicates that men make up the majority of the study's participants.

**Side distribution:** Both sides are examined in comparable proportions, as seen by the fairly balanced distribution of the right (46.60%) and left (53.40%) sides.

**Clinical assessment score, or last follow-up CMS:** Based on the results of the last follow-up CMS, 80.58% of the participants were rated as "excellent," 11.65% as "fair," and 7.77% as "good." According to these findings, participants' general health was good.

**UCLA's most recent activity level assessment follow-up:** According to the UCLA results, 77.67% of individuals received a "excellent" result, indicating that most participants had a high level of activity. There are relatively few people with good (10.68%) and poor (11.65%) exercise levels.

**Final follow-up functional assessment score (ROWE):** 77.67% of the participants received a "very good" rating based on the ROWE results. None of the participants had a "good" score, which is a sign that things are going well.

**Direct radiograph results:** 80.58% of individuals had normal results, indicating that they were in good general health. While the absence of severe findings suggests a favorable scenario, the presence of mild (7.77%) and moderate (11.65%) findings suggests that some people may have health issues.

80.58% of individuals reported never having experienced subluxation or dislocation. Relatively few people suffered from dislocation (11.65%) and subluxation (7.77%), suggesting a speedy recovery from the injury.

Overall, **Table 2** indicates that the participants' health is in generally good condition. The gender distribution is dominated by men, although this should be considered when extrapolating the findings. According to recent follow-up evaluations, most individuals exhibit normal findings and excellent activity levels. Additionally, a relatively small percentage of people had post-injury dislocations or subluxations, indicating that the course of therapy was effective. All things considered, these findings point to an improvement in the participants' functional level and general health. **Table 3** shows the last follow-up evaluation results by gender.

Analysis of **Table 3** reveals that the health status profiles of the male and female individuals are comparable. When examined

Table 3. Comparison of clinical outcomes by gender						
		Gender				p
		Female		Male		
		n	%	n	%	
Last follow-up CMS (0-100)	0-70: Poor	0	.00	0	.00	0.129
	70-79: Fair	4	23.53	8	9.30	
	80-89: Good	0	.00	8	9.30	
	90-100: Excellent	13	76.47	70	81.40	
Last follow-up UCLA	0-25: Poor	4	23.53	8	9.30	0.098
	25-33: Good	0	.00	11	12.79	
	34-35: Excellent	13	76.47	67	77.91	
Last follow-up rowe	Very good (90-100 points)	13	76.47	67	77.91	0.098
	Good (75-89 points)	0	.00	0	.00	
	Fair (51-74 points)	0	.00	11	12.79	
	Poor (points and below)	4	23.53	8	9.30	
Last follow-up plain radiograph findings	Normal	13	76.47	70	81.40	0.129
	Mild 3 mm<	0	.00	8	9.30	
	Moderate 3-7 mm	4	23.53	8	9.30	
	Severe >7 mm	0	.00	0	.00	
Dislocation or subluxation	Not out	13	76.47	70	81.40	0.129
	Dislocation	4	23.53	8	9.30	
	Subluxation	0	.00	8	9.30	

CMS: Clinical evaluation score, UCLA: University of California at Los Angeles

in this manner,

Compared to 81.40% of men, 76.47% of women had a good outcome on the last follow-up CMS (clinical evaluation score). Women were more likely than males to get intermediate (70-79) outcomes (23.53%).

**UCLA's most recent activity level assessment follow-up:** Compared to 77.91% of males, 76.47% of women had an outstanding level of activity. The fact that more women

(23.53%) than males (23.53%) received low scores (0-25) raises the possibility that women overall are less active.

**Last follow-up Rowe:** 76.47% of women and 77.91% of men received the "very good" rating. In this instance as well, 23.53% of women received low scores, suggesting that functional issues were more common among women than males.

**Direct radiographic findings:** Compared to 81.40% of men, 76.47% of women have normal findings. Women are more likely than males to have mild or moderate findings, which could mean that they are more susceptible to certain health issues.

**Status of dislocation or subluxation:** Compared to 81.40% of men, 76.47% of women report never having had a dislocation or subluxation. Compared to men, women were far more likely to undergo dislocation or subluxation (23.53%).

Overall, there were some variations in the health and activity levels of male and female individuals, as **Table 3** demonstrates. Additionally, the p-values (ranging from 0.098 to 0.129) do not demonstrate a statistically significant difference, suggesting that gender generally has no discernible impact on the ultimate follow-up results. **Table 4** shows the final follow-up evaluation results by party.

Table 4. Comparison of clinical outcomes by side (right vs. left)						
		Party				p
		Right		Left		
		n	%	n	%	
Last follow-up CMS (0-100)	0-70: Poor	0	.00	0	.00	0.010*
	70-79: Fair	4	8.33	8	14.55	
	80-89: Good	0	.00	8	14.55	
	90-100: Excellent	44	91.67	39	70.91	
Last follow-up UCLA	0-25: Poor	4	8.33	8	14.55	0.002*
	25-33: Good	0	.00	11	20.00	
	34-35: Excellent	44	91.67	36	65.45	
	Very good (90-100 points)	41	85.42	39	70.91	0.202
Last follow-up Rowe	Good (75-89 points)	0	.00	0	.00	
	Fair (51-74 points)	3	6.25	8	14.55	
	Poor (50 points and below)	4	8.33	8	14.55	
	Normal	44	91.67	39	70.91	0.010*
Last follow-up plain radiograph findings	Light 3 mm<	0	.00	8	14.55	
	Moderate 3-7 mm	4	8.33	8	14.55	
	Severe >7 mm	0	.00	0	.00	
	Not dislocated	44	91.67	39	70.91	0.010*
Dislocation or subluxation not dislocated	Dislocated	4	8.33	8	14.55	
	Subluxated	0	.00	8	14.55	

CMS: Clinical evaluation score, UCLA: University of California at Los Angeles

The results of the most recent follow-up evaluation are shown in **Table 4** by the right and left sides of the participants. Overall, it is evident that the right side produced superior outcomes. Consequently, **Table 4** is examined;

**Last follow-up CMS (clinical evaluation score):** Compared to 70.91% of left-sided participants, 91.67% of right-sided patients achieved an outstanding performance. The right-sided participants were usually in better health, as seen by

the higher percentage of left-sided participants (14.55%) with intermediate (70-79) scores compared to the right-sided participants (14.55%).

**UCLA's most recent activity level assessment follow-up:** Compared to 65.45% on the left, 91.67% on the right had an exceptional activity level. On the right side, 8.33% of participants fall into the poor (0-25) category, while on the left side, 14.55% are in the poor category. This indicates that there is more activity on the right side.

**Rowe for the most recent follow-up:** For the right side, 85.42% of individuals received a "very good" score, compared to 70.91% for the left. In this case, the right side's total functioning state is superior to the left's. Nevertheless, there is no statistically significant difference indicated by the p-value (0.202).

**Direct radiographic results:** 70.91% of the left side had normal findings, while 91.67% of the right side had normal findings as well. The left side had a larger percentage of patients with mild to moderate findings, which supports the right side's superior general health.

Status of dislocation or subluxation: 70.91% of individuals on the left side experienced dislocation or subluxation, compared to 91.67% of participants on the right. 8.33% of people on the right side and 14.55% of people on the left side reported dislocation or subluxation. This indicates that the right side recovered from the damage more quickly.

According to **Table 4**, participants who were right-sided often outperformed those who were left-sided in terms of their level of exercise and general health. The success of treatment procedures may be supported by higher scores on the right side. It appears that the right side's health state is a problem that requires greater attention given that the p-values indicate substantial variances in various regions, including UCLA and CMS.

The study's findings demonstrate that the participants' overall health and course of therapy were favorable. Overall, strong clinical and functional evaluation ratings were obtained when factors including gender, age and side were examined. The fact that most of the participants received outstanding or very good ratings shows how well the treatment plans worked and how well the recovery processes of the individuals were managed. Nonetheless, minor health issues and subluxation that have been noted in certain people highlight the significance of individual variances and unique strategies. According to the findings, long-term follow-up is essential for assessing how well treatment plans are working and may raise the standard of medical care.

## DISCUSSION

The long-term clinical and radiological outcomes of arthroscopic Bankart repair were thoroughly assessed in this study. The results offer fresh implications in certain areas and are generally in line with other research in the literature. The effectiveness and dependability of the treatment are particularly demonstrated by the data collected during extended follow-up periods.

Recurrence rates in this study of 11.65% for dislocation and 7.77% for subluxation are consistent with the 11% recurrence rate reported by Harris et al.<sup>9</sup> The similarity in findings may be attributed to comparable methodologies, including the

use of arthroscopic techniques and long-term follow-up durations. However, differences in patient demographics, such as the proportion of younger participants in our study, and variations in rehabilitation protocols may explain some of the slight differences. For instance, while Harris et al.<sup>10</sup> did not emphasize gender-specific outcomes, our study highlights significant disparities in CMS scores between men and women, suggesting that individual characteristics and treatment customization may impact long-term success. Hormonal and biomechanical variations may be linked to women's generally poorer physical performance. Although the impact of gender on results has frequently been understated in the literature, this finding implies that treatment procedures should account for gender variations.

Long-term prevention of significant degenerative changes in the glenohumeral joint is possible, as evidenced by the fact that 80.58% of participants had normal radiographic findings. In the Castagna et al.<sup>11</sup> trial the arthritis rate was reported to be 29%. The success of surgical surgery is supported by the fact that the rates of arthritis in our study were restricted to mild and moderate levels. On the other hand, the absence of severe arthritis is a significant finding for long-term outcomes. In a study of young patients, Flinkkilä et al.<sup>12</sup> obtained similar findings. The low prevalence of arthritis, particularly among young people, highlights how crucial it is to use surgical technique and rehabilitation procedures correctly.

In general, the dominant side produced higher results, according to the results of the comparison between the right and left sides. The dominant side had a superior healing process, as seen by the 91.67% of right-sided subjects who obtained flawless CMS scores. The dominant side healed with less problems, according to the Brox et al.<sup>13</sup> study. Due to its more frequent use and better neuromuscular coordination.<sup>15</sup> Additionally, rehabilitation challenges specific to the non-dominant side, such as a lower baseline of strength and coordination, may further contribute to these differences.

Long-term results have typically been assessed in a small number of patients in numerous studies published in the literature.<sup>14,15</sup> Our study's lengthy follow-up time and substantial participant count provide significant additions to the body of knowledge. Understanding the findings of our study has been aided by the examination of the causes of recurrence rates in studies like Harris et al.<sup>9</sup> and Buscayret et al.<sup>16</sup> Our study's great patient satisfaction (77.67% excellent activity level) and minimal recurrence rates further demonstrate the efficacy of arthroscopic Bankart repair.

There are several restrictions on this study. Because of its retrospective approach and lack of a randomized controlled group, it is especially important to use caution when extrapolating the findings. Nonetheless, the lengthy follow-up period and sizable patient group boost the study's worth. Future research should compare various surgical procedures and use prospective and randomized controlled methodologies. Furthermore, a more thorough analysis of the consequences of rehabilitation procedures can help to improve therapy results.

## CONCLUSION

Our study demonstrates that arthroscopic Bankart repair is an effective approach for achieving favorable long-term radiographic and clinical outcomes. High patient satisfaction

and low recurrence rates emphasize the reliability and safety of this technique. Additionally, it is important to consider patient-specific factors, such as gender and potential adverse effects, when designing individualized treatment plans. Future research as well as clinical practice may benefit from these findings.

## ETHICAL DECLARATIONS

### Ethics Committee Approval

The study was carried out with the permission of the Atatürk University Faculty of Medicine Clinical Researches Ethics Committee (Date: 01.10.2020, Decision No: 05).

### Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

### Referee Evaluation Process

Externally peer-reviewed.

### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

### Financial Disclosure

The authors declared that this study has received no financial support.

### Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

## REFERENCES

- Peltz CD, Zauel R, Ramo N, Mehran N, Moutzouros V, Bey MJ. Differences in glenohumeral joint morphology between patients with anterior shoulder instability and healthy, uninjured volunteers. *J Shoulder Elbow Surg.* 2015;24(7):1014-1020. doi:10.1016/j.jse.2015.03.024
- Gunnar A. The burden of musculoskeletal diseases in the us: prevalence, societal and economic cost. *Am Acad Orthopaed Surg.* 2008;6(1):146. doi:10.1016/j.jamcollsurg.2008.06.146
- Robinson CM, Dobson RJ. Anterior instability of the shoulder after trauma. *J Bone Joint Surg Br.* 2004;86(4):469-479. doi:10.1302/0301-620x.86b4
- Owens BD, Duffey ML, Nelson BJ, DeBerardino TM, Taylor DC, Mountcastle SB. The incidence and characteristics of shoulder instability at the United States Military Academy. *Am J Sports Med.* 2007;35(7):1168-1173. doi:10.1177/0363546506295179
- Hovellius L. Incidence of shoulder dislocation in Sweden. *Clin Orthop Relat Res.* 1982;166:127-131.
- Buscayret F, Edwards TB, Szabo I, Adeleine P, Coudane H, Walch G. Glenohumeral arthrosis in anterior instability before and after surgical treatment: incidence and contributing factors. *Am J Sports Med.* 2004;32(5):1165-1172. doi:10.1177/0363546503262686
- Bottoni CR, Smith EL, Berkowitz MJ, Towle RB, Moore JH. Arthroscopic versus open shoulder stabilization for recurrent anterior instability: a prospective randomized clinical trial. *Am J Sports Med.* 2006;34(11):1730-1737. doi:10.1177/0363546506288239
- McHugh ML. The chi-square test of independence. *Biochem Med (Zagreb).* 2013;23(2):143-149. doi:10.11613/bm.2013.018
- Harris JD, Gupta AK, Mall NA, et al. Long-term outcomes after Bankart shoulder stabilization. *Arthroscopy.* 2013;29(5):920-933. doi:10.1016/j.arthro.2012.11.010
- López Torres O, Fernández-Eliás VE. Training and nutrition for performance: males, females, and gender differences. *Nutrients.* 2024;16(23):3979. doi:10.3390/nu16233979
- Noonan B, Wojtyś EM. Gender Differences in Muscular Protection of the Knee. In: Noyes F, Barber-Westin S. (eds) *ACL Injuries in the Female Athlete.* Springer, Berlin, Heidelberg. 2018.
- Ee GW, Mohamed S, Tan AH. Long term results of arthroscopic Bankart repair for traumatic anterior shoulder instability. *J Orthop Surg Res.* 2011;6:28. doi:10.1186/1749-799X-6-28
- Castagna A, Markopoulos N, Conti M, Delle Rose G, Papadaku E, Garofalo R. Arthroscopic bankart suture-anchor repair: radiological and clinical outcome at minimum 10 years of follow-up. *Am J Sports Med.* 2010;38(10):2012-2016. doi:10.1177/0363546510372614
- Flinkkilä T, Knappe R, Sirniö K, Ohtonen P, Leppilahti J. Long-term results of arthroscopic Bankart repair: minimum 10 years of follow-up. *Knee Surg Sports Traumatol Arthrosc.* 2018;26(1):94-99. doi:10.1007/s00167-017-4504-z
- Brox JI, Lereim P, Merckoll E, Finnanger AM. Radiographic classification of glenohumeral arthrosis. *Acta Orthop Scand.* 2003;74(2):186-189. doi:10.1080/00016470310013932
- Marquardt B, Witt KA, Götze C, Liem D, Steinbeck J, Pözl W. Long-term results of arthroscopic Bankart repair with a bioabsorbable tack. *Am J Sports Med.* 2006;34(12):1906-1910. doi:10.1177/0363546506290404
- Vermeulen AE, Landman EBM, Veen EJD, Nienhuis S, Koorevaar CT. Long-term clinical outcome of arthroscopic Bankart repair with suture anchors. *J Shoulder Elbow Surg.* 2019;28(5):e137-e143. doi:10.1016/j.jse.2018.09.027
- Buscayret F, Edwards TB, Szabo I, Adeleine P, Coudane H, Walch G. Glenohumeral arthrosis in anterior instability before and after surgical treatment: incidence and contributing factors. *Am J Sports Med.* 2004;32(5):1165-1172. doi:10.1177/0363546503262686