

**RESEARCH
ARTICLE**

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Epidemiological and Clinical Characteristics of Anterior Shoulder Dislocation Patients in Emergency Departments in Turkey: A Single-Center Experience

ABSTRACT

Objective: This study evaluated the general epidemiological and clinical characteristics of patients admitted to the emergency department with shoulder dislocation.

Methods: This single-center retrospective cross-sectional study, which included patients with anterior shoulder dislocation, was conducted as a chart review at the Emergency Department of the Tekirdag State Hospital between 01 January 2018 to 31 December 2019.

Results: A total of 165 patients (median age 50 years and 60% of males) with anterior shoulder dislocation were included. The most common mechanism was traumatic dislocation (65.5%), the primary reduction technique was traction/countertraction (80.6%). Two-thirds of the patients had right shoulder dislocation, traumatic dislocation, and sedoanalgesia was not required. Age was lower in men, but spontaneous dislocation was more common. The diagnosis was made with an x-ray at a rate of 99%. Emergency physicians were 96% successful.

Conclusions: Direct radiography successfully makes the diagnosis of anterior shoulder dislocation. Anterior dislocation management by emergency physicians is highly successful. It should be considered that atraumatic dislocations are more common in young male patients.

Keywords: Shoulder Dislocation, Anterior Dislocation, Traction, Emergency Department, Turkey.

Türkiye'de Acil Servislerde Ön Omuz Çıkığı Hastalarının Epidemiyolojik ve Klinik Özellikleri: Tek Merkez Deneyimi

ÖZET

Amaç: Bu çalışmada acil servise omuz çıkığı ile başvuran hastaların genel epidemiyolojik ve klinik özellikleri değerlendirildi.

Gereç ve Yöntem: Tek merkezli, retrospektif kesitsel çalışmamızda 01 Ocak 2018 - 31 Aralık 2019 tarihleri arasında Tekirdağ Devlet Hastanesi acil servisinde ön omuz çıkığı olan hastaları incelemesi üzerine yapılmıştır.

Bulgular: Ön omuz çıkığı olan toplam 165 hasta (ortanca yaş 50 ve %60'ı erkekti) dahil edildi. En sık mekanizma travmatik çıkık (%65.5), birincil redüksiyon tekniği traksiyon/ters traksiyon (%80.6) idi. Hastaların üçte ikisinde sağ omuz çıkığı vardı. Ayrıca travmatik çıkıkta vardı ve bunlara sedoanaljezi gerekmedi. Erkeklerde yaş daha gençti ancak spontan çıkık daha yaygındı. Tamı %99 oranında röntgen ile konuldu. Acil servis hekimleri %96 başarılıydı.

Sonuç: Direkt grafi ön omuz çıkığının tanısını başarıyla koyar. Acil hekimleri tarafından anterior çıkık tedavisi oldukça başarılıdır. Atravmatik çıkıkların genç erkek hastalarda daha sık görüldüğü akıldan tutulmalıdır.

Anahtar Kelimeler: Omuz Çıkığı, Anterior Çıkık, Traksiyon, Acil Servis, Türkiye

INTRODUCTION

The shoulder is the most common site among all joint dislocations admitted to the emergency department, and the most common shoulder dislocation is an anterior shoulder dislocation (1, 2). Previous studies reported that the overall annual incidence might be as high as 23.9 per 100,000 injuries, or 56.3 per 100,000 individuals per year (2, 3). Although there is no national incidence available, a previous study from Turkey reported a 5.3 per 100,000 person-years, significantly lower than the incidence rates reported for western countries (4). The anatomical characteristics of the glenohumeral joint, which has the greatest range of motion of all joints, also make it the most unstable and vulnerable to dislocation (5). The dislocation mechanism is the removal of the humeral head from joint socket to an anterior direction in almost all cases, which is generally due to a low-energy trauma (6).

Identifying the general epidemiological and clinical characteristics can guide acute management, indication for surgical intervention to prevent recurrence, and education for the patient to rehabilitate and reduce longer term morbidity. This is particularly relevant for young male patients with Bankart's lesions who are at very high risk of recurrence without early surgical intervention, implying acute management's importance (7). Therefore, this study evaluated the general epidemiological and clinical characteristics, treatment courses, and outcomes of patients admitted to the emergency department with shoulder dislocations.

MATERIAL AND METHODS

This retrospective cross-sectional study was conducted as a chart review at the Emergency Department of the Tekirdag State Hospital. Patients admitted to the emergency service with a shoulder joint injury between 01 January 2018 to 31 December 2019 were screened from the electronic hospital database system. Patients aged 18 years and older, diagnosed in the emergency department, first reduction performed at the emergency department, and patients with anterior shoulder dislocation were included in the study. The patients with other shoulder dislocations and the first intervention out of the emergency department were excluded from the study. The diagnosis of shoulder dislocation was made by direct radiography or CT. The primary endpoints were epidemiological and clinical characteristics, and the secondary endpoints were patients' treatment characteristics and outcomes as follows:

- **Primary Endpoints:** Age, Gender, Vital signs at admission, Route of entry, Lateralization, Type of dislocation, Mechanism of dislocation

- **Secondary Endpoints:** Pre-reduction and post-reduction imaging modality, Sedoanalgesia, Reduction technique, Practitioner of reduction, Is dislocation recurrent, Presence of simultaneous injury, Post-reduction complication, Length of stay in emergency service, Outcome of treatment in emergency service

Statistical Analyses: Descriptive statistics were presented using median and interquartile range (25th-75th percentiles – IQR) for continuous variables after controlling for normal distribution, and using frequency and percent for categorical variables. In addition, the Mann-Whitney U test and Chi-square test were performed between independent groups for these variables, respectively. A type-1 error level of 5% was considered the statistical significance upper limit ($p < 0.05$). All statistical analyses were done in SPSS 25 software (IBM Inc., Armonk, NY, USA).

RESULTS

A total of 165 patients with a median age of 50 years and 60% of males were included in the study. All patients had an anterior dislocation, 54.5% were outpatients, and 64.8% were admitted with dislocation on the right shoulder joint. The most common mechanism was traumatic dislocation (65.5%). The primary diagnostic imaging method was X-Ray both at admission (98.8%) and after reduction (98.2%). One-third of patients received sedation/analgesia, mainly with midazolam (72.7%), and 3.6% received fentanyl. The primary maneuver was traction/countertraction to relocate the affected shoulder in 80.6% of cases, followed by external rotation in 13.3%. An emergency medicine specialist applied the maneuver in 96.4% of cases. Only 1.2% of all patients had a simultaneous humerus fracture. Patients stayed at emergency department for a median of 60 minutes, 99.4% were discharged, and only one patient was hospitalized for further treatment (Table 1).

The comparisons of demographic and clinical data between males and females (Table 2) revealed that males were younger (M/F: median 26/70 years, $p < 0.001$), more admitted as outpatients (M/F: 75.8%/22.7%, $p < 0.001$), had more spontaneous dislocations (M/F: 46.5%/16.7%, $p < 0.001$), received more ketamine (M/F: 8.1%/none) and less propofol (M/F: 1%/9.1%) as sedoanalgesics ($p = 0.013$) and stayed less in the emergency department during their treatment (M/F: median [IQR] 60 [40-60]/60 [60-120] minutes, $p < 0.001$).

Table 1. Demographic and clinical characteristics of patients with anterior shoulder dislocation

	n (%) / Median [IQR]
Age, years	50 [24-70]
Sex	
<i>Male</i>	99 (60.0)
<i>Female</i>	66 (40.0)
Route of entry	
<i>Ambulance</i>	75 (45.5)
<i>Outpatient</i>	90 (54.5)
Lateralization of dislocation	
<i>Right</i>	107 (64.8)
<i>Left</i>	58 (35.2)
Mechanism of dislocation	
<i>Spontaneous</i>	57 (34.5)
<i>Traumatic</i>	108 (65.5)
Pre-reduction imaging	
<i>Computerized tomography</i>	2 (1.2)
<i>X-Ray</i>	163 (98.8)
Post-reduction imaging	
<i>Computerized tomography</i>	3 (1.8)
<i>Xray</i>	162 (98.2)
Sedation/analgesia	
<i>Administered</i>	55 (33.3)
<i>Ketamine</i>	8 (14.5)
<i>Midazolam</i>	40 (72.7)
<i>Propofol</i>	7 (12.7)
<i>None</i>	110 (66.7)
Reduction technique	
<i>Cunningham</i>	7 (4.2)
<i>External rotation</i>	22 (13.3)
<i>Kocher</i>	1 (0.6)
<i>Stimson</i>	2 (1.2)
<i>Traction/countertraction</i>	133 (80.6)
Practitioner of reduction	
<i>Emergency medicine specialist</i>	159 (96.4)
<i>Orthopedician</i>	6 (3.6)
Length of stay in the emergency department, minutes	60 [60-120]

IQR: Interquartile range

The comparisons of demographic and clinical characteristics of patients according to the mechanism of dislocation are presented in Table 3. Analyses revealed that patients with spontaneous dislocations were younger (median 25 years vs. 61.5 years, $p<0.001$) and predominantly males (80.7% vs. 49.1%, $p<0.001$). Traumatic dislocations were mainly admitted to the emergency department via ambulance services ($p<0.001$). Moreover, spontaneous dislocations tended to be recurrent dislocations when compared to traumatic ones ($p<0.001$), and traumatic dislocations were more associated with spontaneous humerus fractures ($p=0.008$) and stayed at the emergency department for a longer duration ($p<0.001$).

DISCUSSION

Shoulder dislocations are the most common large-joint dislocation presenting to emergency departments, but epidemiological and clinical features of these cases are under investigated in Turkey. Thus, this study evaluated the general demographic and clinical characteristics of these patients. To summarize, our results on an extensive

series of cases including 165 patients revealed that the median age was 50 years, and 60% of cases were males. Nevertheless, when the age of patients was evaluated according to sex, males were significantly younger, and median age groups were 2nd and 7th decades for males and females, respectively. Moreover, the mechanism of dislocations was also significantly associated with these baseline demographics that spontaneous dislocations were observed in males and younger ages.

To the best of our knowledge, the epidemiological characteristics of shoulder dislocations in Turkey were only investigated by Tas et al. on 208 cases (8). Authors reported that their patients were mainly males, and peak age groups for males and females were between 21 to 30 years and 61 to 70 years, respectively. The proportion of recurrent dislocations was similar, 22.4% among our cases and 17.3% in the reference study. These background characteristics were in accordance with our results, suggesting a similar pattern of patients in Turkey.

Table 2. Comparisons of demographic and clinical data between genders

	Sex		p
	Male (n=99)	Female (n=66)	
	n (%) / Median [IQR]	n (%) / Median [IQR]	
Age, years	26 [23-47]	70 [62-73]	<0.001
Route of entry			<0.001
<i>Ambulance</i>	24 (24.2)	51 (77.3)	
<i>Outpatient</i>	75 (75.8)	15 (22.7)	
Lateralization of dislocation			0.46
<i>Right</i>	62 (62.6)	45 (68.2)	
<i>Left</i>	37 (37.4)	21 (31.8)	
Mechanism of dislocation			<0.001
<i>Spontaneous</i>	46 (46.5)	11 (16.7)	
<i>Traumatic</i>	53 (53.5)	55 (83.3)	
Pre-reduction imaging			0.52
<i>Computerized tomography</i>	2 (2)	-	
<i>X-Ray</i>	97 (98)	66 (100)	
Post-reduction imaging			0.062
<i>Computerized tomography</i>	-	3 (4.5)	
<i>Xray</i>	99 (100)	63 (95.5)	
Sedation/analgesia			0.013
<i>Ketamine</i>	8 (8.1)	-	
<i>Midazolam</i>	23 (23.2)	17 (25.8)	
<i>Propofol</i>	1 (1)	6 (9.1)	
<i>Fentanyl</i>	4 (4)	2 (3)	
<i>None</i>	63 (63.6)	41 (62.1)	
Reduction technique			0.90
<i>Cunningham</i>	4 (4)	3 (4.5)	
<i>External rotation</i>	14 (14.1)	8 (12.1)	
<i>Kocher</i>	1 (1)	-	
<i>Stimson</i>	2 (2)	-	
<i>Traction/countertraction</i>	78 (78.8)	55 (83.3)	
Practitioner of reduction			0.22
<i>Emergency medicine specialist</i>	97 (98)	62 (93.9)	
<i>Orthopedician</i>	2 (2)	4 (6.1)	
Length of stay in the emergency department, minutes	60 [40-60]	60 [60-120]	<0.001

IQR: Interquartile range

Table 3. Comparisons of demographic and clinical data between spontaneous and traumatic dislocations

	Mechanism of dislocation		p
	Spontaneous (n=57)	Traumatic (n=108)	
	n (%) / Median [IQR]	n (%) / Median [IQR]	
Age, years	25 [23-47]	61.5 [35-72.5]	<0.001
Sex			<0.001
<i>Male</i>	46 (80.7)	53 (49.1)	
<i>Female</i>	11 (19.3)	55 (50.9)	
Route of entry			<0.001
<i>Ambulance</i>	9 (15.8)	66 (61.1)	
<i>Outpatient</i>	48 (84.2)	42 (38.9)	
Lateralization of dislocation			0.084
<i>Right</i>	42 (73.7)	65 (60.2)	
<i>Left</i>	15 (26.3)	43 (39.8)	
Pre-reduction imaging			0.55
<i>Computerized tomography</i>	-	2 (1.9)	
<i>X-Ray</i>	57 (100)	106 (98.1)	
Post-reduction imaging			0.55
<i>Computerized tomography</i>	-	3 (2.8)	
<i>Xray</i>	57 (100)	105 (97.2)	
Sedation/analgesia			0.88
<i>Ketamine</i>	2 (3.5)	6 (5.6)	
<i>Midazolam</i>	16 (28.1)	24 (22.2)	
<i>Propofol</i>	3 (5.3)	4 (3.7)	
<i>Fentanyl</i>	2 (3.5)	4 (3.7)	
<i>None</i>	34 (59.6)	70 (64.8)	
Reduction technique			0.22
<i>Cunningham</i>	1 (1.8)	6 (5.6)	
<i>External rotation</i>	6 (10.5)	16 (14.8)	
<i>Kocher</i>	-	1 (0.9)	
<i>Stimson</i>	2 (3.5)	-	
<i>Traction/countertraction</i>	48 (84.2)	85 (78.7)	
Practitioner of reduction			0.094
<i>Emergency medicine specialist</i>	57 (100)	102 (94.4)	
<i>Orthopedician</i>	-	6 (5.6)	
Length of stay in the emergency department, minutes	60 [40-60]	60 [60-120]	<0.001

IQR: Interquartile range

The difference between the two studies was that 94.3% of their cases had anterior dislocations, and relocation was made in the emergency department in 79.3% of patients, whereas all patients in our study had an anterior dislocation and 96.4% of them were relocated in the emergency department in our study.

The international studies that evaluated these characteristics also reported different results which might be associated with the population-specific features. For example, Liavaag et al. (3) studied the epidemiological characteristics of shoulder dislocations in Oslo, Norway. They reported that primary dislocations formed 46.6% and recurrent dislocations 41.4% of total cases, which is significantly higher for recurrent dislocations than in our study. The ages of males and females were also slightly different, median 34 and 54 years, respectively, which is notably higher for males than our results. Another study from Sweden by Nordqvist et al. (9) reported median ages of 44 and 63 for males and females in shoulder injuries, respectively, which is also significantly higher for males than our findings. These differences suggest that shoulder dislocations are seen at younger ages among males in Turkey.

The mechanism of shoulder dislocation was evaluated extensively in the literature. The primary etiology in young males was reported to be contact sports (10). The excess external rotation in abduction impulses the humeral head out of the socket and avulses the anterior structures of the glenoid, also classified as the Bankart lesion. Then, the posterior humeral head exits the joint and forms an indentation called the Hill Sachs lesion when positioned in line with the anterior rim of the glenoid (11). This type of dislocation is typically diagnosed with X-Ray, the first-choice imaging method for traumatic shoulder pathologies (12). Our results showed that this is also the case among our cases, in which almost all patients were diagnosed, and the relocations were confirmed by X-Ray imaging. Nevertheless, up to 60% of bone lesions may not be identified by the X-Ray, and computerized tomography emerges as the preferred method for these cases (13). But, only less than 2% of our patients needed further imaging with computerized tomography, which implies the importance of X-Ray for shoulder dislocations.

The primary treatment of anterior shoulder dislocation is the reduction of the humerus head. The literature data on this revealed that the most frequent maneuvers for reduction are traction/countertraction, Kocher, Cunningham, Stimson plus scapular manipulation, and external rotation plus Milch methods (1, 14). The primary maneuver for reduction among our cases was traction/countertraction in 80.6% of cases, followed by external rotation in 13.3%. The traction-counter

traction maneuver is applied when a physician pulls the dislocated arm in 45° abduction and external rotation position, while another pulls the patient's chest in the counter direction. This traction and countertraction are best applied when two sheets or towels are wrapped on the chest and tied to the elbow of dislocated arm for pulling in opposite directions. And, for the external rotation method, there is still debate on whether it is better than internal rotation or not. Some authors reported that these strategies provide similar outcomes (15,16), but several others reported that external rotation is associated with lower recurrence (17).

As a consequence, the experience and expertise of the physician seemed to be deterministic of the best method to apply. Also, apart from the maneuver of choice for treatments, adequate analgesia is another determinant of successful reduction. About one-third of our patients received sedoanalgesia, primarily with midazolam, and 3.6% received fentanyl. The effectiveness of analgesia before the reduction was evaluated in several previous studies. For example, Taylor et al. (18) compared propofol and midazolam and reported that propofol was as effective as midazolam/fentanyl and associated with better muscle relaxation. There are also other studies conducted with different agents or administration routes like intraarticular injections, suprascapular nerve blocks, etc. (19-21), which all can be concluded as that the effectiveness is important when only considered along with the expertise of the physician administering the reduction maneuver appropriately (22).

The choice of technique should be informed by the subtype of anterior shoulder dislocation. Kocher, Cunningham and external rotation maneuvers are designed to be used in subcoracoid dislocations and are not well suited to subglenoid dislocations. This means that even for an experienced practitioner, the wrong choice of technique may result in an unsuccessful attempt, or excessive use of analgesia/sedation, or the incorrect application of traction.

This study is the first case review to analyze the incidence of anterior shoulder injury subtypes and the appropriateness of applied techniques in the emergency departments in Turkey. The main limitation of the study is that the subtypes of the dislocations were not adequately detailed in the reports, meaning that there is limited understanding of the importance of injury subtype in the assessment and subsequent technique choice in shoulder dislocations. Nevertheless, the data presented and the limitations underlined in this study may enhance the clinical practices regarding the management of shoulder dislocations in emergency departments.

CONCLUSION

Epidemiological data on shoulder dislocation in Turkey is scarce. This is the second study that provides recent evidence on the demographic and clinical characteristics of these patients as well as the treatment methods and outcomes of these cases in emergency departments. Direct radiography successfully makes the

diagnosis of anterior shoulder dislocation. Anterior dislocation management by emergency physicians is highly successful. It should be considered that atraumatic dislocations are more common in young male patients. Further studies evaluating the incidence and long-term follow-up data are also needed to better elucidate epidemiological features and clinical interventions' effectiveness.

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