Shoulder dislocations attended in a regional hospital: Are all the radiographs ordered necessary?

NATIVITAT ORTELLS ABUYE

Servicio de Urgencias, Hospital de Palamós (SSIBE), Girona, Spain.

CORRESPONDENCE:
Nativitat Ortells Abuye
Servicio de Urgencias
Hospital de Palamós (SSIBE)
C/Hospital, 36
Palamós
Girona, Spain
E-mail: nortells@ssibe.cat

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The authors declare no conflict of interest in relation with the present article.

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Objectives: The aim of this study was to describe our hospital emergency department's management of glenohumeral dislocations and to assess whether application of the Quebec algorithm would significantly decrease the number of radiographs ordered.
Methods: Retrospective descriptive, cross-sectional study of cases treated in our regional hospital emergency department in 2011. Among the variables analyzed were sociodemographic characteristics, mechanism involved in causing the dislocation, availability or not of a pre-reduction and/or post-reduction radiograph, and presence or absence of fracture.
Results: A total of 89 glenohumeral dislocations were treated; 66.3% were in men. The mean (SD) age was 45 years. Fracture was 6-fold more likely in patients over the age of 40 years than in younger patients. A pre-reduction radiograph was ordered in 87% of the dislocations treated in our emergency department; a post-reduction radiograph was ordered in 94.8% of these cases. Fractures were associated with the dislocation in 7 cases (8.1%). Fracture was significantly associated with the mechanism involved in causing the dislocation (trauma vs nontrauma, *P*=.038). Nontrauma patients and those with repeat dislocations did not have fractures. A total of 151 radiographs were ordered. If the Quebec algorithm had been applied, approximately 75 radiographs would have been ordered, leading to a savings of 49.6%.
Conclusions: Mechanism of injury and recurring dislocations are 2 of the factors related to ordering a pre-reduction radiograph. Use of the Quebec decision-making algorithm would have saved neerly half of radiographs. [Emergencias 2014;26:121-124]

Keywords: Dislocation, shoulder. Radiography. Shoulder fractures.

Introduction

Dislocation of the shoulder is frequently treated in the emergency department (ED). Worldwide, its incidence is 17 per 100,000 population[1-3]. In glenohumeral dislocation, the most common type is the anterior dislocation[4] (90-95%). The most common mechanism of injury is trauma. Falling on an outstretched arm and direct impact are more common in the elderly, versus sports and traffic accidents in younger people. The recurrence of shoulder dislocation, especially in the young, is often the reason for return visits to the ED.

Standard procedure in the ED used to involve an X-ray before and after reduction. The first was performed to verify dislocation, and diagnose potential associated fractures, while the second was performed to confirm the reduction. In recent years this has been questioned. Some authors[5-7] advocate not performing pre-reduction X-rays for all dislocations, using decision algorithms that save irradiation considered unnecessary, Other authors[8,9] advocate skipping the post-reduction X-ray because proper placement of the joint can be verified clinically. The objective of this study was to describe and evaluate radiologic procedure for glenohumeral dislocations treated in our hospital ED in 2011 and see if the fact of using the Quebec decision algorithm significantly reduces the number of radiographs requested.

Method

This retrospective cross-sectional descriptive

study was conducted in the ED of a community hospital in 2011. We collected data on all shoulder dislocations by ICD 9 coding discharge reports. Acromioclavicular dislocations were excluded, since they do not require reduction. We included sociodemographics, mechanism of injury, the existence of pre-reduction or post-reduction radiography, which professional ordered it, the presence or absence of associated fractures, if the dislocation was recurrent, and the need for pre-reduction medication.

The data were recorded on a database and descriptive statistics were performed with frequencies and Fisher's exact test with 95% confidence intervals (CI). All analyses were performed using SPSS version 18. The study was approved by the "Departamento de Avaluació i Recerca" and the Ethics Committee.

Results

In 2011 a total of 89 glenohumeral dislocations were attended in the ED; 97.8% anterior dislocations and only 2.2% posterior dislocations. Triage level on admission was as follows: 47.3% Level 2, 32.7% Level 3, and 20% level 4 using the Spanish Triage System (SET) in which the different levels of triage can vary according to the degree of pain on ED arrival. Two thirds (66.3%: 59 cases) occurred in men. Mean age was 45 years (SD 24) with a minimum of 9 and a maximum of 93 years. Half (50.6%) the cases involved patients under 40 years of age (Table 1).

Of all dislocations, 86.5% (77 cases) were reduced in the ED, 11.2% (10 cases) occurred spontaneously and 2.2%[2] were previously reduced in a primary care center (CAP) before referral to the ED for radiography. Of the patients receiving reduction in the ED, pre-reduction radiography was performed in 87% (67 cases) of which 85.1% (57 cases) were ordered by the triage nurse, which significantly reduces the total ED stay time compared with the system of physician order (p = 0.032).

All trauma patients (p = 0.001) underwent pre-reduction radiography. Seven fractures (8.1%) associated with dislocation were diagnosed; 86.8% were visualized in pre-reduction radiographs and only one fracture, listed as questionable. We found no significant association between age (> 40 years) and fracture, although the likelihood of fracture over 40 years was 6 times higher than those aged 40 years or less. We did find a significant association between fracture and mechanism of injury (traumatic, atraumatic, p = 0.038). All fractures were caused by trauma. Over half (57.3%, 51 cases) of the dislocations were produced by a traumatic mechanism and 42.7% by atraumatic mechanism. None of the medical report included the existence of humeral ecchymosis, even in patients with dislocation and fracture; 35.9% (32 cases) were recurrent dislocations without associated fracture. Most patients (94.8 %) with dislocations reduced in the ED underwent posterior radiographic control.

Of a total 151 radiographs performed, use of the Quebec algorithm would have reduced that figure to about 75, representing a saving of 49.6% (Figure 1). The vast majority of dislocations (94.4%) were reduced by the ED physician on duty versus 5.6% by the orthopedist. Dislocations were reduced in the ED employing the Kocher maneuver, or similar, without using medication in most cases (72.1%) while 24% received intravenous midazolam and / or fentanyl. In the remaining cases reduction was performed in the operating room. We found no association between sex and pre-reduction medication; twice as many men needed pre-reduction medication, but it was only women who needed reduction in the operating room (p = 0.003).

Table 1. Characteristics of patients with shoulder dislocations (N = 89)

Variables	N (%)
Sex	
Male	59 (66.3)
Female	30 (33.7)
Age (years)	
< 40	45 (50.6)
40-60	15 (16.9)
> 60	29 (32.6)
Radiography	
Pre-reduction	67 (87*)
Post-reduction	73 (94.8*)
Fracture	7 (8.1)
mechanism	
Trauma	51 (57.3)
Atraumatic	38 (41.7)
Recurrent dislocation	32 (35.9)
Medication	
No medication	57 (72.1)
With medication	19 (24)
Operating Room	3 (3.7)
Reduction	
Emergency dept.	77 (86.5)
Emergency physician	72 (93.5)
Orthopedist	5 (6.4)
CAP	2 (2.2)
Spontaneous	10 (11.2)
Orthopedic material	
Gillchrist	84 (94.4)
Sling	5 (5.6)

* Reduced in the emergency department.

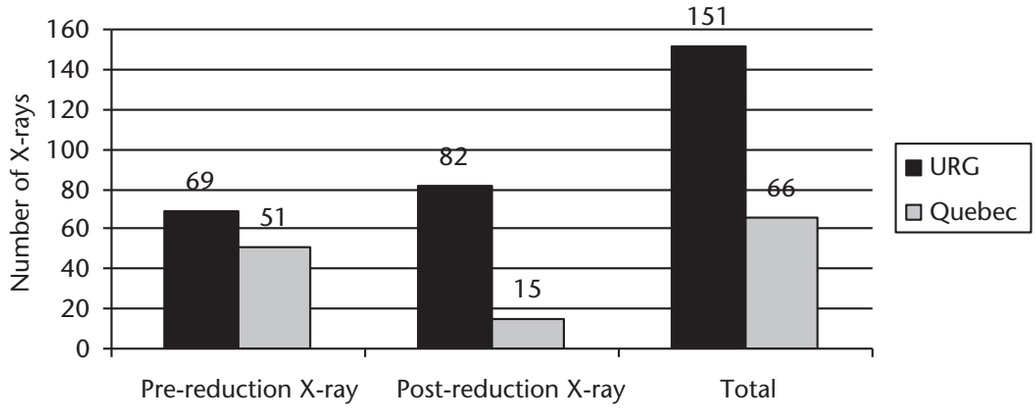

Figure 1. Comparison of X-rays actually ordered in the ED (labelled URG) versus those that would have been ordered on applying the Quebec decision-making algorithm.

Discussion

The study on the need to request radiographs for shoulder dislocations, both pre- reduction and post-reduction, has shown us different algorithms of action. One of the best known is the Quebec Shoulder Dislocation decision rule[10] (Figure 2), which identifies three factors that predict dislocation and fracture of the shoulder (the latter being the reason for ordering an X-ray - to rule out fractures), since simple shoulder dislocation is easily recognizable by any emergency physician. Predictive factors are age >40 years, a first episode of dislocation and an injury mechanism of falling from a height greater than one's own height, a contact sports accident, or a traffic accident. In our study, we confirmed the Quebec criteria although the mechanism of injury in most cases was not specified in the discharge report. Thus, we believe that pre-reduction radiography should be ordered in all trauma patients. Traffic accidents and contact sport accidents were reflected in the discharge report but the height of the fall was not reported in cases of accidental falls. Surprisingly little detail was included in the medical records, and none documented humeral ecchymosis, not even involving fracture. Still, only considering the criteria age <40, atraumatic mechanism and recurrent dislocation would have reduced the nuber of X-rays significantly. We found only one case of fracture dislocation in the under 40 age-group, and no cases of recurrent dislocation fracture.

Ong et al.[11] questioned the sensitivity and specificity of the Quebec criteria for this younger group. Orloski et al.[12] reported a low incidence of fracture dislocations in the under 40 group and therefore recommended the omission of pre-reduction radiography in these cases.

Radiography after reduction was requested for virtually all cases. However, some authors have argued it would not be necessary as long as the emergency physician is sure the reduction was properly performed and fractures are ruled out by pre-reduction radiography. This is the same clinical criterion used in the Quebec algorithm. Therefore, we believe that the application of the Quebec algorithm on triage would reduce the length of stay in the ED, as well as about 50% of radiographs.

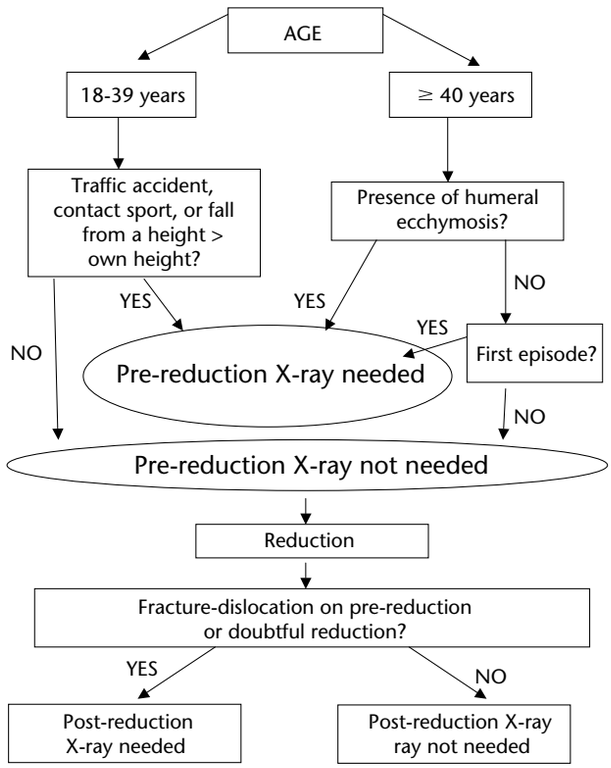

Figure 2. The Quebec algorithm.

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Análisis de la solicitud de radiografías en las luxaciones de hombro atendidas en un hospital comarcal

Ortells Abuye N

Objetivo: Describir la actuación sobre las luxaciones glenohumerales atendidas en urgencias y comprobar si el hecho de utilizar el algoritmo de Quebec disminuye significativamente el número de radiografías solicitadas.
Método: Estudio descriptivo retrospectivo de corte transversal en el año 2011 realizado en el servicio de urgencias de un hospital comarcal. Valoramos las variables sociodemográficas, el mecanismo lesional, la existencia de radiografía prerreducción, la radiografía posreducción y la existencia o no de fracturas entre otras variables.
Resultados: Se atendieron 89 luxaciones glenohumerales. Un 66,3% se produjeron en hombres. La media de edad fue de 45 años. La probabilidad de sufrir fracturas en las mayores de 40 años fue 6 veces superior que en los menores de 40 años. De los pacientes a los que se les redujo la luxación en urgencias, a un 87% se les pidió radiografía prerreducción y al 94,8% radiografía posreducción. Se diagnosticaron 7 fracturas (8,1%) asociadas a la luxación. Encontramos asociación significativa entre fractura y mecanismo lesional (traumático, atraumático) (p = 0,038). Los pacientes atraumáticos y recidivantes no sufrieron fracturas. Al total de luxaciones se solicitó 151 radiografías. Utilizando el algoritmo de Quebec se hubiera solicitado aproximadamente 75, lo que representa un ahorro del 49,6% de radiografías.
Conclusiones: El mecanismo lesional y las luxaciones recidivantes son dos determinantes a la hora de pedir radiografía prerreducción. Utilizando el algoritmo de decisión de Quebec se habrían ahorrado casi la mitad de radiografías. [Emergencias 2014;26:121-124]

Palabras clave: Luxación de hombro. Radiografía. Fractura.