ORIGINAL ARTICLE

Audit on Radiographs in Anterior Shoulder Dislocations

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Summary

The radiographs of 115 anterior shoulder dislocations (100 patients; 74 males, 26 females, mean age 35 ± 18 years) were reviewed to assess the radiographic views used in the management of this dislocation. Eighty-eight patients (88%) had only the anteroposterior (AP) view, 10 patients had 2 radiographic views taken and only 2 patients had three radiographic views. Hill-Sachs lesions were found in 18%, and glenoid rim fractures in 3% of the patients. A greater tuberosity fracture was found in 18% of the patients. Therefore, the current practice in the management of an acute anterior shoulder dislocation appears to be to perform a single view (AP) pre-reduction radiograph to confirm the diagnosis and a single view (AP) post reduction radiograph to confirm reduction after a close manipulative reduction has been performed. This practice is likely to result in an underestimate of associated Hill Sachs lesion and glenoid rim fractures, but not greater tuberosity fractures.

Key Words: Anterior shoulder dislocation, Radiographs, Audit, Hill-Sachs lesion

Introduction

Anterior shoulder dislocations, accounting for up to 97% of all shoulder dislocations, is the most common major joint dislocation[1,2]. In adults, primary shoulder dislocations represent up to 17% of all major injuries of the shoulder girdle[3]. Anterior shoulder dislocations are therefore, a commonly seen injury. While the diagnosis of an anterior shoulder dislocation can usually be made from the clinical history and physical examination, plain radiographs are nevertheless necessary to confirm the direction of the dislocation, to diagnose any associated fractures and also to identify any possible barriers to reduction[4].

It is generally accepted that a minimum of 2 radiographic views is necessary although opinions may differ on the exact radiographic views required[4-9]. One of the most popular orthopaedic textbooks for undergraduate medical students and postgraduate trainees in Malaysia recommended an anteroposterior (AP) view and a lateral view in the plane of the scapula[6]. The specialist shoulder textbooks recommend 3 views. Rockwood and Wirth[7] recommended the 3 orthogonal projections of the shoulder (anteroposterior view in the plane of the scapula, a scapular lateral and an axillary view) because they felt that fewer views or other less interpretable projections might obscure significant pathologic processes. Matthews and Pavlovich[8] suggested an anteroposterior view supplemented with a Velpeau and scapulothoracic views because the latter 2 views do not require abduction, and is thus more comfortable for the patients than an axillary, West point, Stryker or Didiee views.

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In view of their common occurrence, it would be easy to assume that anterior shoulder dislocations would be routinely investigated radiologically by at least 2 radiographic views. However, it is the experience of the authors that often, only a single radiographic view (anteroposterior) is obtained in acute anterior dislocations of the shoulder in the hospitals in the United Kingdom and Malaysia that they have worked in.

The objectives of this study are to assess the current practice in the radiographic imaging of acute anterior shoulder dislocations, and to report on the incidence of associated fractures found on these radiographs.

Materials and Methods

All anterior shoulder dislocations treated between October 1998 and September 2000 were included in this retrospective cross-sectional study. Of a total of 143 shoulder dislocations identified from the census book, only 117 dislocations were reviewed as 26 case notes were missing, giving a retrieval rate of 82%.

All the radiographs in each case notes were reviewed independently by 2 orthopaedic surgeons. These radiographs included pre-reduction, post-reduction and any subsequent radiographs taken at follow-up clinics. The radiographic views performed, and the presence of any associated fractures was recorded onto a proforma. In patients where 2 radiographs were obtained but which both radiographs closely resembled AP views, we considered that only a single AP view was obtained instead of 2 different views.

Data was evaluated statistically using Statistical Packages for Social Sciences software (SPSS, version 9.0, Chicago, Ill. USA).

Results

Of the 117 shoulder dislocations initially identified, 2 dislocations were posterior dislocations and were therefore excluded from further analysis. The remaining 115 dislocations occurred in 100 patients. There were 80 patients with primary dislocations; 75 of these patients had only a single known dislocation during the study period, and 5 patients went on to develop recurrent dislocations (16 dislocations). Seven patients had one previous dislocation and sustained their second dislocation and the other 13 patients with a history of recurrent dislocations accounted for the remaining 17 dislocations. Seventy-four patients were males and 26 females. The mean age of patients was 35 ± 18 years (14-88 years).

Eighty-eight patients (88%) had only the anteroposterior (AP) view radiographs of their shoulder performed. Ten patients had two radiographic views taken and only 2 patients had three radiographic views (Table I). If we considered only radiographic views obtained in the accident and emergency department prior to reduction, 95 patients had a single view only. 'AP and Lat' radiographs were often requested in the request form by the attending surgeon or doctor without specifying whether the lateral view required was an axillary lateral or a transcapular lateral.

Thirty-nine patients had associated fractures at the gleno-humeral joint. A greater tuberosity fracture was seen in 18 patients, a Hill-Sachs lesion in 18 patients, and a glenoid rim fracture (bony Bankart) in 3 patients. Hill-Sachs lesions were most frequently seen in patients in the age group 21-30 years and were not seen in patients older than 60 years. The Stryker view in 2 patients both showed Hill-Sachs lesions. The highest incidence of fractures of the greater tuberosity in the patients was in the age group between 41-50 years, where it was found in 57% of the patients.

Although we did not set out to assess the quality of the radiographs, we noted that many of the radiographs taken in the accident and emergency department were not of good quality. Most of the AP radiographs were AP in the plane of the chest, and not in the plane of the scapula. Some were taken at such an angle that they resembled a trans-scapular lateral view. Some 'AP and Lateral' views appeared almost identical (Figure 1 and 2).

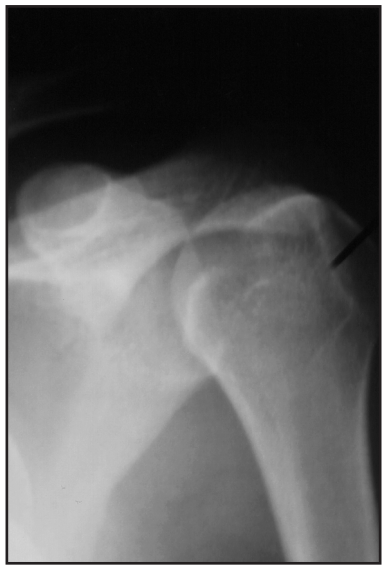


Fig 1: A Hill-Sachs lesion on an AP radiograph appears as a sharp, vertical, line of condensation, as indicated by the black line. The length correlates with the size of the defect. Hill-Sachs lesion on the AP view is best seen with the shoulder in internal rotation as shown here on this post-reduction radiograph where the patient's shoulder had been strapped to his chest.

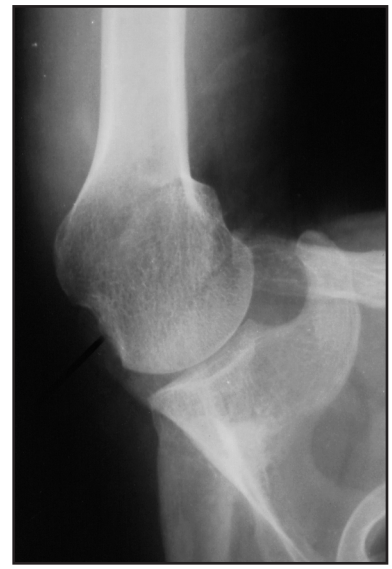
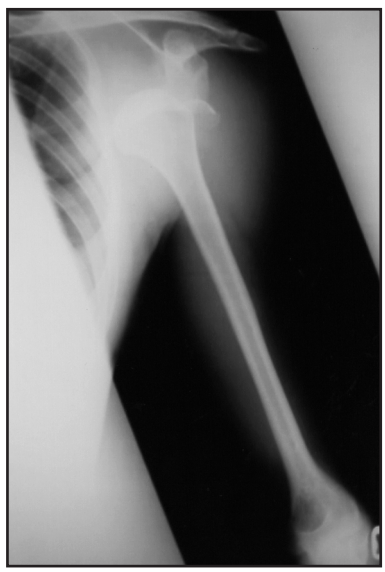


Fig 2: A Stryker view of the shoulder showing a Hill-Sachs lesion (indicated by the black line) on the posterolateral aspect of the humeral head.



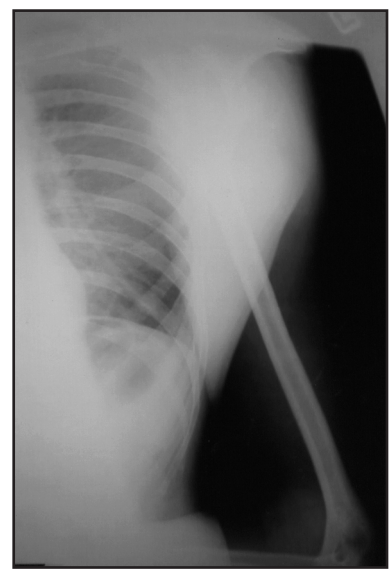


Fig 3&4: Poor quality 'AP and Lat' radiographs showing an anterior dislocation of the shoulder associated with a fracture of the greater tuberosity. The lateral view appears fairly similar to the AP view, and the details at the shoulder could not be adequately seen.

Table I: The radiographic views and the number of patients in each group

Radiographic view	1 view (N=88)	2 views (N=10)	3 views (N=2)
AP	88	10	2
Axillary	-	3	2
Transcapular	-	2	2
Stryker	-	2	-
AP oblique	-	3	-

Discussion

The findings of this audit suggests that in general, the current clinical practice in the management of an acute anterior shoulder dislocation is to perform a single view (AP) pre-reduction radiograph to confirm the diagnosis and a single view (AP) post reduction radiograph to confirm reduction after a close manipulative reduction has been performed. This was similar to the findings of a previous audit on proximal humeral fractures where the vast majority (82%) of the patients had only a single view[10].

Why is only a single view performed when it is a well-accepted axiom in orthopaedics that to adequately evaluate any injury, at least 2 radiographic views is necessary? We were not able to identify the exact reasons for this because of the retrospective nature of the study. In the audit on proximal humeral fractures, one of the most common reasons given by the medical officers in this study on why a single view was accepted was the inability of the radiographers to perform the requested views[10]. The radiographers in the accident and emergency department may be inexperienced and therefore may not know the different radiographic views and how to perform them. Although 'AP and Lat' radiographs were requested in some cases, only a single view (AP) was usually performed despite this. It is important to bear in mind that when requesting for a 'lateral' view of the shoulder joint, writing "Lat view" only is unfortunately not specific enough. In a busy accident and emergency department with several doctors working at the same time, radiographers may not have the time to clarify the exact views required. Therefore, it is important to be clear and specific on the lateral view required (eg. trans-scapular, axillary).

A displaced glenoid rim fracture has been reported to increase the risk of recurrent dislocation and has therefore been considered an indication for early surgical fixation of the fracture[7]. The best radiographic view to diagnose glenoid rim fractures is a Westpoint or a Didiee view[11]. Taylor and Arciero found glenoid rim fractures in 22% of their patients on the West Point view, and these were confirmed arthroscopically[12]. Hovelius *et al*[13] reported an 8% incidence and they felt that the true incidence should be higher as their patients also did not have the necessary views. In Vermeiren *et al's* study[14], it was 3.2% but they did not describe the radiographic views that their patients had to diagnose this fracture. The incidence of a glenoid rim fractures this study was low (3%) compared to other previous reports. As only 5 of the patients in this study had an axillary lateral view radiograph, the incidence found here is likely to be an underestimate of the true incidence and we are possibly undertreating these fractures.

The incidence of Hill-Sachs lesion depends on both the radiographic view and the age of the patient[4]. Although no single view will always reveal a Hill-Sachs lesion[15], the best views to demonstrate a Hill-Sachs lesion are the Stryker or the internally rotated anteroposterior views of the shoulder[11,16]. The incidence of Hill-Sachs lesion in this study is also much lower than those reported in other studies. Hovelius *et al*[13] reported an incidence of 55% radiographically, in their group of patients who were aged below 40 years. Of the 63 patients below 24 years of age who had a traumatic primary dislocation in Taylor and Arciero's study[12], Hill-Sachs lesions were found in 57 patients on arthroscopy, although it was osteochondral in only 34 patients. Hintermann and Gachter[17] found Hill-Sachs lesions in 68% of 212 patients who had at least 1 documented shoulder dislocations on arthroscopy. We believe that the low incidence found in this study is erroneous due to the limited radiographic views performed. Stryker views were only performed in 2 patients, and both of these patients had a Hill-Sach lesion, which were not evident in their AP radiograph.

What is the significance of a Hill-Sachs lesion other than it being pathognomonic of a previous anterior dislocation? In cases of subtle shoulder instability without frank dislocation, clinical diagnosis may be difficult, and the presence of a Hill-Sachs lesion may aid in the diagnosis. Hill-Sachs lesion has been associated with an increased risk of recurrence, and in Hovelius' definitive prospective study[18], the recurrence rate in patients with Hill-Sachs lesions was 60% while those without Hill-Sachs lesions had a recurrence rate of 44%. Thus, these lesions should be identified early to provide a more accurate estimation of the risk of recurrence to the patients. However, it should be emphasized that the identification of a Hill-Sachs lesion in the acute management of an anterior shoulder dislocation is not important and we should not cause the patients further discomfort by performing unnecessary radiographs. The Stryker view radiographs in this study were both performed in the outpatient clinic and we have been able to obtain good quality radiographs.

A greater tuberosity fracture was seen in 18% of the patients. They were only seen in primary dislocation and the incidence of this fracture in primary anterior dislocation was in fact 21.8%. Visser *et al*[19] found an incidence of 15.6% in 77 patients who had AP, lateral and 45° craniocaudal radiographic views. Vermeiren *et al*[12] found an incidence of 20% while Simonet *et al*[20] reported an incidence of 3%. In patients aged between 34-40 years with a primary dislocation who had at least 2 radiographic projections, Hovelius *et al*[13] reported an incidence of 30%. Fifteen of the 18 patients with a greater tuberosity fracture had only a single radiographic view and 3 patients had 2 radiographic views. Fractures of the greater tuberosity are usually displaced in a dislocated shoulder and are therefore usually easily seen on the pre-reduction AP view radiograph. We do not think that a single projection is likely to result in a significant underdiagnosing of this fracture but it is insufficient to evaluate the degree of displacement once reduction has been achieved. Also, when a greater tuberosity fracture is seen, further views have been recommended to avoid missing an undisplaced humeral neck fracture. The humeral neck can displace during reduction if not prophylactically fixed[21]. We did not find any such cases in our study.

Patients with primary anterior shoulder dislocations in this study were mostly only seen by medical officers or orthopaedic trainees who may not be aware of the need to further evaluate these injuries and the best radiographic views to do so. We could not ascertain if the practice of using only a single view has resulted in any missed dislocations by less inexperienced doctors. We hope that by highlighting the best radiographic views to visualise the associated fractures, that they would obtain a better understanding of this condition. We also emphasise the need to be specific on the 'lateral' view that is required when such view is required.

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