



# Sonography as a new modality in the management of shoulder dislocation

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### ABSTRACT

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The need for both pre- and post-reduction radiographs has recently been questioned when treating shoulder dislocation. Several case reports and case series have suggested that ultrasonography might be useful bedside diagnostic modality for evaluating shoulder dislocation.

The purpose of this review was to evaluate studies that questioned necessity of radiographs for shoulder dislocation and also studies that evaluated bedside ultrasound as an alternative modality in shoulder dislocation.

Ultrasonography can be used in patients with suspected shoulder dislocation. It cannot replace radiography because of possible associated fractures but it can be used before and after reduction to confirm successful relocation to reduce the risk of repeated sedation. It can also increase the certainty of physicians in cases that shoulder dislocation management needs to be performed without X-ray assessment.

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## Introduction

The glenohumeral joint is the most commonly dislocated major joint in the body. The lack of intrinsic bone stability in conjunction with its wide range of motion predisposes the joint to dislocation. The glenohumeral joint can dislocate anteriorly, posteriorly, inferiorly or superiorly. The annual incidence is 17 per 100000 and anterior dislocation account for 95 to 97% of all glenohumeral dislocations [1]. Posterior and inferior dislocations are far less common.

Diagnostic strategies of these dislocations usually consist of trauma series of radiographs which can confirm the clinical diagnosis and identify the position of humeral head. In fact, radiographic documentation of dislocation type and any associated fractures should generally be obtained before reduction is attempted. It is also generally recommended that radiographic studies should

be performed after reduction to confirm reduction and identify any associated fractures. The need for both pre- and post-reduction radiographs has recently been questioned when treating anterior shoulder dislocation [2-6]. However, these studies did not address the issue whether the physicians were able to determine clinically that the shoulder had been relocated or not [3,4]. Then pre-reduction and post-reduction radiographs would be necessary in all cases. Moreover, findings on the most studies in the field of elimination of pre- and post-reduction radiographs were very subjective, however, one could not assume that all practitioners will have the same clinical acumen. For these reasons, although these studies have questioned the need, cost effectiveness and time consuming of pre- and post-reduction radiographs, imaging of suspected shoulder dislocation remained advisable in most

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cases. Recently, several case reports and case series have suggested that ultrasonography might be a useful bedside diagnostic modality for evaluating shoulder dislocation [7-12]. In fact, pre- and post-reduction radiographs cannot be eliminated because of existing concerns that aforementioned. Since another diagnostic modality should be performed and be considered to improve clinical decision making and help the improvement of guidelines that are seeking to modify the use of pre- and post-reduction radiographs. In fact, ultrasound examination can be performed quickly, decreased cost or time, easily learned, characterized by one or two easily findings and also can be done at the bedside. These advantages of this modality can help the improvement of clinical decision for elimination of pre- and post-reduction radiographs in most cases.

The purpose of this review was to evaluate studies that questioned the necessity of radiographs for shoulder dislocation in addition to studies that evaluated bedside ultrasound as an alternative modality in shoulder dislocation.

### ***Radiographs in shoulder dislocation under question***

Emergency physicians frequently cared for patients who have sustained a shoulder dislocation; typically, pre-reduction and post-reduction radiographs were performed. The notion that all such patients require both pre- and post-reduction radiographs has been challenged by several authors.

Necessity of post-reduction radiographs after shoulder dislocation reduction was challenged because most post-reduction X-Ray films were read as normal and most reductions were clinically obvious to both physicians and patients [3]. Three authors evaluated the necessity of post-reduction radiographs after shoulder dislocation reduction and whether these films could add clinically important information to what was seen on pre-reduction X-rays in emergency department (ED) or not [3,5,13]. Harvey et al commented that no additional clinical significant fractures were discovered by post-reduction radiographs and all fractures previously noted on pre-reduction X-ray films [3]. Although Kahn et al discovered 6 new fractures among 67 patients on post-reduction films, they stated that none of missed fractures on pre-reduction X-rays changed patient management in ED [13]. Hendy et al also discovered three cases of new fractures on post-reduction films but these fractures were also present on pre-reduction X-rays and they were just missed on the original interpretation [5].

Four other authors evaluated whether experienced emergency physicians could identify a subgroup of patients with shoulder dislocation for whom pre-reduction radiographs did not alter pa-

tient management [2-4,14]. In the study of Shuster et al, the physicians were certain of shoulder dislocation by clinical examination alone in 67.8% of patients and all of them found to have dislocation and pre-reduction radiographs did not affect management of the injury [2]. Hendy et al discovered certainty for shoulder dislocation equal to one hundred percent in patients with recurrent shoulder dislocation and there were no fractures in this group of patient. They reported accuracy of confident assessment of 98 percent. They reported that assessment algorithm could reduce radiographs by 51% [3]. Shuster et al prospectively determined whether their treatment guideline safely eliminated unnecessary radiographs or not, reported that the treatment guideline eliminated 88.9% of pre-reduction radiographs [14]. In another study by Hendy et al, they found no missed fractures or persistent dislocation on follow-up and stated that the use of clinical decision rule for selective radiography of shoulder dislocation could reduce the number of radiographs and time spent on ED while missing no fractures or dislocations [4].

### ***Ultrasonography as a diagnostic modality for shoulder dislocation***

So far, performing ultrasonography for shoulder dislocation as a diagnostic and confirmatory modality has not been described widely in the literature in the management of shoulder dislocation.

As mentioned earlier, only several case reports and one case series with small number of patients have suggested that ultrasonography might be useful as a bedside diagnostic modality for evaluating shoulder dislocation [7,8,10,12,15,16]. Purpose of such studies was to evaluate ultrasonography as a diagnostic method to obviate the need for radiographs, which could lead to less radiation exposure, reduce the need for resedation by more rapid identification of unsuccessful reduction, reduce cost and shorten ED throughout times.

Abbasi et al. [7] assessed diagnostic accuracy of ultrasonography in detecting shoulder dislocation and confirming proper reduction. These authors reported that ultrasonography did not miss any dislocation and the results of ultrasonography and radiography were identical and the sensitivity of ultrasonography was 100% in the detection of shoulder dislocation and 100% for the assessment of complete reduction of shoulder joint. Study population was the biggest among all other studies about this issue while other studies were just case reports and case series with small number of patients.

Blakeley et al. [8] demonstrated that bedside ultrasonography could correctly confirm successful reduction in 5 cases of anterior shoulder dislocation. Similarly, Halberg et al [10] presented 2 cases of an-

terior and posterior shoulder dislocation for which the success of the reduction process was confirmed correctly with ultrasonography; same as last two case reports Yuen et al. [12] reported 2 cases of acute posterior shoulder dislocation confirmed by bedside ultrasonography. Beck et al. [15] also reported a case that based on physical examination it was thought to be anterior dislocation and ultrasonography clearly demonstrated a posterior shoulder dislocation. Stone et al. [16] also performed anterior shoulder dislocation diagnosis and reduction confirmation by means of ultrasonography. Similarly, Mackenzi et al. [17] reported another case in this field.

## Discussion

The need for pre- and post-reduction X-rays has been questioned over the past decades in shoulder dislocations [2-6]. As mentioned earlier, the purposes of these studies were to demonstrate that pre- and post-reduction radiographs were not necessary in all patients based on clinical features and examination, clinical decision-making, certainty of physicians and selection of patients. They all wanted to acknowledge that if some larger studies performed to validate the results in this field, it will be possible to present a guideline to reduce pre- and post-reduction radiographs based on clinical decision making. Nevertheless, it seems to be some obstacles to achieve this purpose, which can be solved by means of adding another modality.

Sonography as a time consuming, safe, noninvasive, convenient, easy learning and without ionizing radiation modality can help the achievement of reduction of pre- and post-reduction radiographs [18]. By using sonography, physician can check for proper reduction and physicians could have multiple attempts at reducing the shoulder without the need for re-sedating the patient [7]. Another advantage of sonography is the detection of posterior shoulder dislocation which may be easily be missed either by clinical examination or radiography [15]. Another obstacle in front of authors, who want to present a guideline, is that the clinical examination may be inaccurate in traumatic patients with shoulder dislocation who experience severe pain and painful shoulder and resistance against motion could simulate shoulder dislocation. In these cases, sonography can be applied as a diagnostic modality.

In summary, ultrasonography can be used for patients with suspected shoulder dislocation. It cannot replace radiography because of possible associated fractures, but it can be used before and after reduction to confirm successful relocation to reduce the risk of repeated sedation.

It can also increase the certainty of physicians in cases that shoulder dislocation management needs to be performed without X-ray assessment.

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## Conflict of Interest

The authors declare no conflict of interest.

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