Does musculoskeletal ultrasound play a role in diagnosing and managing shoulder dislocations?

Miles Hunter¹ · Meaghan Mackenzie¹ · Nicholas Packer¹

Received: 8 March 2021 / Accepted: 10 April 2021 / Published online: 23 April 2021

© The Author(s), under exclusive licence to Canadian Association of Emergency Physicians (CAEP)/ Association Canadienne de Médecine d'Urgence (ACMU) 2021

Keywords Shoulder dislocation · Ultrasound · POCUS

Full Citation: Secko et al. Musculoskeletal ultrasonography to diagnose dislocated shoulders: a prospective cohort. *Ann Emerg Med.* Aug 2020;76(2):119–128. Weingrow & Franco. The evolving role of ultrasonography in diagnosing and managing shoulder dislocations. *Ann Emerg Med.* Aug 2020;76(2):129–130

Abstract Link: <https://pubmed.ncbi.nlm.nih.gov/32111508/>. <https://pubmed.ncbi.nlm.nih.gov/32389437/>

Article Type: Diagnosis

Ratings: *Methods*—3/5, *Usefulness*—3/5

Introduction

Background

Point-of-care ultrasound (POCUS) is emerging as a highly sensitive and specific modality for diagnosing shoulder dislocations [1, 2].

Objectives

Determine the accuracy of a posterior approach POCUS technique to diagnose shoulder dislocations and fractures, assess time to image acquisition and time to diagnosis, diagnostic cut-off for glenohumeral distance and sonographer confidence.

Methods

Design

Prospective observational study.

Setting

Two academic emergency departments (EDs).

Subjects

Adult patients (≥ 18 years) presenting to the ED with a suspected shoulder dislocation when a study investigator was present.

Exclusion criteria:

- Multiple traumatic injuries.
- Decreased level of consciousness.
- Hemodynamic instability.
- Did not consent.

Intervention

POCUS for suspected shoulder dislocation by a fellowship-trained ED physician using a posterior approach tracing the scapular spine. Confirmatory x-rays pre- and post-reduction were completed. POCUS practitioners were blinded to x-ray imaging and history.

Outcomes

Primary: diagnostic accuracy of POCUS for shoulder dislocation. Secondary: fracture identification, time efficiency, glenohumeral distances and sonographer confidence.

✉ Miles Hunter
mmhunter@ucalgary.ca

¹ Department of Emergency Medicine, Foothills Medical Centre, University of Calgary, Room C231, 1403 29 Street NW, Calgary, AB T2N 2T9, Canada

Main results

- $N=65$ patients were enrolled in the study.
- 49% (32 of 65) had dislocations.
- 38% (25 of 65) had fractures (Tables 1, 2).

Appraisal

Strengths

- ED based study.
- Important clinical question.
- Relevant clinical application of a readily available ED tool.
- Straightforward and well-described POCUS technique.
- Adequate enrollment for pre-determined sample size.
- Rate of dislocation in the study population is less than in previous studies, allowing for more confidence in the high sensitivities and specificities reported.
- Practical secondary objectives.

- Glenohumeral displacement was recorded and used to provide a diagnostic cuff-off predictive of anterior dislocations.
- High degree of sonographer confidence.
- Confirms reduction during sedation.
- Useful when radiography unavailable.

Limitations

- Small sample size.
- Young patient population (mean age 40).
- Limited data on posterior ($n=2$) and inferior ($n=1$) dislocations.
- May lack generalizability to ED docs without POCUS fellowship training.
- Sonographer blinding to history and x-ray images may still leave clear physical exam findings that might have biased results and confidence levels.
- Unable to comment on safety outcomes when not powered to detect harm.
- POCUS images unavailable for consultants.

Table 1 Accuracy of ultrasound for detection of dislocation or fracture

Primary outcome	Detected by POCUS	Test characteristics
Dislocation	100% (32/32)	SN 100% (95% CI 87–100%) SP 100% (95% CI 87–100%)
Fracture	52% (13/25)	Not reported
Hill-Sachs/Bankart (HSB)	15% (2/13)	Not reported
Non-HSB fracture	92% (11/12)	SN 92% (95% CI 60–99.6%) SP 100% (95% CI 92–100%)

Table 2 Secondary outcomes of interest

Time efficiency	Imaging modality	Outcome (interquartile range)
Triage-to-imaging time	POCUS	43 min faster than x-ray (23–60 min)
Image-to-diagnosis time	POCUS	18 s (10–33 s)
Triage-to-diagnosis time	POCUS	51 min (35–78 min)
	X-ray	101 min (73–134 min)
Glenohumeral distance		Median distance (interquartile range)
Dislocation (anterior)		– 1.83 cm (– 1.98 to – 1.41 cm)
Dislocation (posterior)		3.30 cm (2.59 to 4.00 cm)
Non-dislocation		0.22 cm (0.10 to 0.35 cm)
POCUS diagnosis		Sonographer confidence
Non-dislocated		9.1/10
Dislocated		9.4/10

Context

Decision rules have attempted to reduce the need for pre-reduction x-rays in selected populations (young patients; repeat dislocations; atraumatic mechanisms) [3]. These rules are still pending prospective validation. POCUS has been proposed to decrease the need for radiography and improve efficiency [2]. Increasing interest in this application of POCUS followed the publication of a recent meta-analysis (which reported a high degree of accuracy for both detection of dislocations and fractures) [1]. However, as highlighted by Weingrow and Franco's editorial, 48% of fractures were not reliably identified in this study, raising concerns for the use of POCUS alone in the management of suspected shoulder dislocations.

Bottom line

This prospective convenience sample of 65 patients within two academic EDs found that a posterior scapular POCUS approach in the hands of fellowship-trained ED physicians

could be used effectively for diagnosis of suspected shoulder dislocations (100% sensitivity and specificity). This technique demonstrated a 43-min reduction in triage-to-imaging time. However, 48% of fractures were missed with POCUS. In addition to limited fracture identification (particularly in traumatic or first-time dislocation), the study lacks generalizability to a broader ED physician cohort. Even if highly skilled and comfortable with this technique, x-ray imaging is still essential for a diagnosis in question.

References

1. Gottlieb M, Holladay D, Peksa GD. Point-of-care ultrasound for the diagnosis of shoulder dislocation: a systematic review and meta-analysis. *Am J Emerg Med*. 2019;37:757–61.
2. Lahham S, Becker B, Chiem A, et al. Pilot study to determine accuracy of posterior approach ultrasound for shoulder dislocation by novice sonographers. *West J Emerg Med*. 2016;17:377–82.
3. Edmond M, Garipey C, Boucher V, et al. Selective prereduction radiography in anterior shoulder dislocation: the Fresno-Quebec Rule. *J Emerg Med*. 2018;55:218–25.