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Ultrasound in Emergency Medicine

POINT-OF-CARE ULTRASONOGRAPHY TO ASSIST IN THE DIAGNOSIS AND MANAGEMENT OF SUBLUXATION OF THE RADIAL HEAD IN PEDIATRIC PATIENTS: A CASE SERIES

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□ Abstract—Background: A subluxation of the radial head (SRH) is a clinical condition that commonly occurs in children under 6 years of age. History and physical examination findings typically include a child who presents with an elbow held in extension and with forearm pronation, after having suffered significant longitudinal traction on the arm, or after a fall on an outstretched hand. The diagnosis is often clinically obvious. The injury responds dramatically to closed reduction, and usually no imaging is required. However, cases with atypical presentations and patients who do not respond favorably to a reduction maneuver present clinical challenges, because the initial diagnosis of SRH may seem to be questionable or erroneous. **Point-of-care ultrasound (POCUS) can assist decision-making and clinical management for these patients. Case Reports:** We report three cases of SRH that were diagnosed and managed with POCUS in the emergency department. **Why Should an Emergency Physician Be Aware of This?:** POCUS can assist in the diagnosis and management of patients with clinical suspicion of SRH, especially in cases of atypical presentations or cases in which the mechanism of injury is unknown. It is also an extremely valuable tool in determining postprocedure reduction success. © 2017 Elsevier Inc. All rights reserved.

□ Keywords—subluxation of the radial head; point-of-care ultrasound; hook sign; emergency department

INTRODUCTION

A subluxation of the radial head (SRH), also known as “nursemaid’s elbow,” is a common orthopedic injury among children younger than 6 years of age. The mechanism of injury is usually a longitudinal traction of the forearm while the elbow is pronated and extended. Diagnosis is made clinically in almost all cases, due to the patient’s typical presentation and dramatic response to reduction maneuvers (1). However, if the mechanism of injury is unknown or reduction efforts are unsuccessful, radiography is the initial preferred procedure. Results are usually normal.

CASE 1

A 7-month-old girl was brought to the Emergency Department (ED) with the complaints of restlessness and crying. The infant began to cry while her mother was changing her clothes, and she was unwilling to move her right forearm from that point on. She was presented with the elbow extended and the forearm pronated. She looked generally well, active and alert; her vital signs were normal for her age. On physical examination, there were no signs of trauma such as discoloration, swelling,

ecchymosis, or deformity in the right upper extremity. However, she cried with any passive movements of the right elbow. Peripheral pulses were also palpable and equal bilaterally.

POCUS Examination

The elbow was evaluated with point-of-care ultrasound (POCUS) for the possibility of SRH due to the traction mechanism of the forearm while changing the child's clothes. The unaffected elbow joint was examined first to be familiar with the normal view of an elbow joint (Figure 1A). Then, the hypoechoic "hook" or "J" sign was detected in the affected elbow (Figure 1B). The pronation technique was performed for the reduction and a "click" sound was heard. Re-evaluation with POCUS revealed that the supinator muscle (SM) and annular ligament (AL) were no longer in the joint space, but in the normal anatomic position around the radial head (Figure 1C). The infant stopped crying and started to move her right forearm immediately after the procedure.

CASE 2

A 3-year-old boy was brought to the ED due to a pain in his left elbow. The child had been pulled from his left forearm by his father to prevent him from falling while the elbow was extended. He looked generally well, active, and alert. His vital signs were normal for his age and there were no signs of trauma. He was presented with the elbow extended and the forearm pronated. Peripheral pulses were also palpable and equal bilaterally, but left elbow movements were restricted.

POCUS Examination

In this case, the history of the patient supported the diagnosis of SRH. The affected elbow was evaluated with POCUS on the anterior longitudinal axis. The SM and AL, surrounding the radial head, were interposed into the joint space. The pathological "hook sign" was observed (Figure 2A). The supination technique was performed for the first reduction attempt. However, no active forearm movement was observed after the reduction. Re-evaluation with POCUS revealed persistence of the "hook sign." The first reduction attempt was considered to have failed; a second reduction attempt was performed with the hyperpronation technique. After the second attempt, the "hook sign" had disappeared (Figure 2B). The patient stopped crying and started to move his arm without any sign of pain.

CASE 3

An 18-month-old boy was brought to the ED with the complaint of not being able to move his right arm. The patient had started walking only recently. He had been left alone while playing in his room, and then found crying and not moving his right arm. He presented with the elbow extended and the forearm pronated. There were no signs of trauma: the physical examination was normal except for the painful movements of the right elbow.

POCUS Examination

Due to the likelihood of SRH in this age group, this case was also evaluated with POCUS. The "hook sign" was observed (Figure 3A). Reduction was

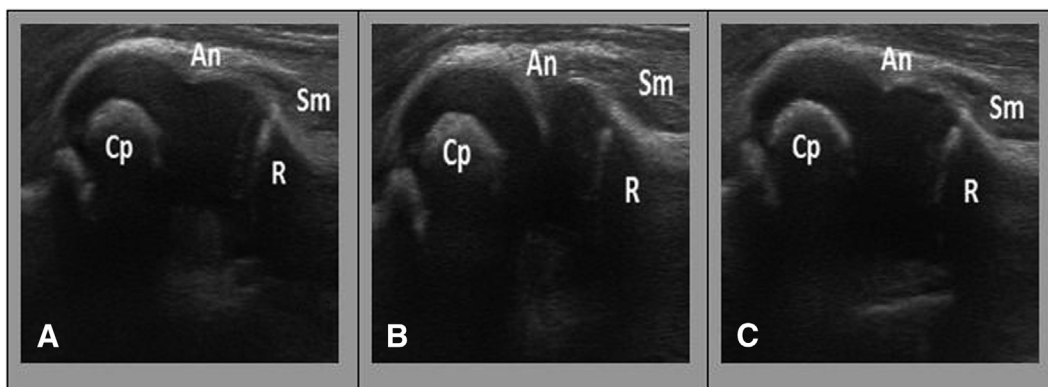


Figure 1. Ultrasonographic images of the patient's unaffected and affected elbow joints. (A) Normal view of the elbow joint shown in the unaffected elbow; the annular ligament is around the radial head and outside the joint space. (B) Pathologic view of the SRH shown in the affected elbow; the annular ligament is in the joint space. This is the pathologic "hook sign" formed by displacement of the annular ligament into the joint space together with some part of the supinator muscle. (C) Postreduction view of the affected elbow after a successful reduction; note the loss of hook sign. An = annular ligament; Cp = capitellum; R = radial head; Sm = supinator muscle; SRH = subluxation of the radial head.

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