Ultrasound in Emergency Medicine

BEDSIDE ULTRASOUND FOR HIP DISLOCATIONS

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CASE REPORT

A 51-year-old man was brought to the ED 20 min after suffering a fall on wet grass while playing basketball in his front yard. He fell from a standing position while retrieving the ball and immediately was unable to get up. The patient had a recent history of cellulitis over the lower back, and was undergoing treatment in a dermatologist’s office. Treatment included incision and drainage supplemented with oral ciprofloxacin. His past medical history was remarkable for hypertension and gastroesophageal reflux disease. His review of systems was negative for fever, chills, chest pain, shortness of breath, abdominal pain, nausea, vomiting, headache, and loss of consciousness. There was, additionally, no loss of sensory or motor function, nor was there any stool or urinary incontinence, and no groin numbness.

Upon presentation, the patient was observed lying in a supine position on the bed with his right leg slightly externally rotated. Initial vital signs were: blood pressure 145/96 mm Hg, pulse 106 beats/min, respirations 22 breaths/min, temperature 37.4°C, height 177.8 cm, and weight 78.9 kg. Complete physical examination of the head, ears, eyes, nose, throat, lungs, and abdomen were unremarkable. Cardiac examination was remarkable only for a tachycardic rate with a regular rhythm. There was normal rectal tone and no sensory loss in the perineum. Musculoskeletal examination demonstrated a limited range of motion of the right lower extremity at the hip secondary to severe pain. There was no deformity. There

INTRODUCTION

Traumatic anterior hip dislocation is an uncommon subset of hip dislocations with a reported incidence of approximately 12% of hip dislocations (1). Diagnosis of these injuries usually relies on pelvic X-ray studies. Although ultrasonography (US) has gained increasing attention over the past several decades as a potential tool for injuries involving the hip and extremities, to our knowledge, it has not previously been reported to diagnose traumatic anterior hip dislocation. We present a case of traumatic anterior hip dislocation diagnosed in a 51-year-old man with bedside ultrasound in the Emergency Department (ED).
were no appreciated motor, sensory, or vascular deficits in either lower extremity. With the exception of the known cellulitis present on the patient’s lower back, the remainder of the physical examination was unremarkable.

This history and physical examination led to suspicion for a hip dislocation as the etiology for this patient’s presentation. Radiographic studies, specifically, an initial portable anteroposterior (AP) pelvic X-ray study, as well as a complete hip series, were ordered. Portable studies were ordered, without lateral views available, secondary to the patient’s severe pain and inability to transfer to the Radiology suite. While awaiting the pelvis X-ray study, bedside ultrasound was performed on the patient’s right and left hip joints. A low frequency 3–5 MHz curvilinear probe was used, and was placed in the anterior, mid-axial, and coronal planes. The bedside ultrasound demonstrated an anterior dislocation of the right femoral head from the acetabulum (Figure 1). The AP pelvis film was then performed, which demonstrated normal hip joint anatomy and failed to identify the dislocation suspected from the examination and ultrasound. Based on findings on US, consultation with Orthopedics was ordered and the patient was prepared for closed reduction of the dislocation. Upon request by the consulting service, a repeat AP and lateral series of the pelvis and right hip was ordered, and subsequently confirmed the right hip anterior dislocation observed on US.

The patient then underwent a closed reduction under procedural sedation in conjunction with the orthopedic service. The hip was reduced without difficulty. He was soon after discharged from the ED with crutches and care instructions along with directions to follow-up in the Orthopedics office.

**DISCUSSION**

Traumatic anterior hip dislocations are relatively uncommon, with a reported incidence of 12% of all traumatic hip dislocations (1). To achieve the dislocation, force is applied with the hip externally rotated and abducted, with the amount of flexion in the femur determining the position of the femoral head after it leaves the acetabulum (1). Classification of this dislocation is typically made based upon the position of the femoral head on examination, with the subtype classifications consisting of pubic, obturator, or perineal. The neurovascular bundle for the anterior compartment of the lower extremity lies anterior to the femoral head and hip joint. This structure may be damaged in anterior dislocations. Severe vascular damage resulting in amputation, and even death, has been reported secondary to this injury (2). Additional complications of anterior dislocations are typically secondary to the position of the femoral head after injury. These include fracture of the femoral head, specifically with obturator dislocations, and degenerative arthritis.

Diagnosis of hip dislocations usually begins with an AP pelvic X-ray study that may demonstrate the presence of the femoral head outside of the acetabulum. An
accompanying lateral view may further demonstrate anterior or posterior dislocation. Although both AP and lateral views are typically ordered in such cases of suspected hip dislocations, the patient presented herein was in excruciating pain and unable to have his initial X-ray studies in the Radiology suite. Instead, he had a portable AP pelvis view in the examination room as an initial measure to establish the diagnosis.

As described, US was used while awaiting the portable films. US evaluation of the hip for dislocation involves placement of the probe immediately superior to the inguinal ligament on the proximal thigh. When imaging bony structures such as the hip, it is important to remember that bone appears as a bright echogenic structure on US and that the only clearly visible portion of the bone is the superficial cortex (3). The US technique described herein relied on a linear transducer in the anterior, mid-axial, and coronal planes. The abnormality seen on US that corresponded to the dislocation in this patient consisted of an anterior displacement of the femoral head in relation to the rim of the acetabulum.

Ultrasound evaluation of the extremities and specifically, the hip joint, has a multi-decade history, most notably within the realm of assessing developmental dysplasia of the hip in newborns (4). There are, however, other indications for which sonography is useful, including but not limited to evaluation of hip effusions, proximal femoral focal deficiency, iliopsoas tendinopathy, and complications of total hip arthroplasty (4). Other uses include the detection of occult femoral head fractures and the evaluation of various soft tissue conditions involving the tendons, muscles, and neurovascular structures (3,5). ED bedside ultrasonography of the hip joint has commonly been utilized in the evaluation of pediatric hip pain for the presence of joint effusions (6). To our knowledge, there have been no cases of hip joint dislocation diagnosed by bedside ultrasound reported in the medical literature to date.

It is imperative to achieve early diagnosis of anterior hip dislocations so that appropriate orthopedic consultation and reduction efforts can be initiated to prevent long-term complications, as the prognosis of hip dislocation is dependent upon the time elapsed between the injury and relocation of the femoral head. Multiple studies have demonstrated poor outcomes in hips that are reduced > 24 h after the injury. Reduction within 6 h of injury has a reported osteonecrosis rate of 4%, increasing to 17.6% with reduction between 6 and 12 h, and increasing still to almost 57% after 12 h (1). The case outlined in this report highlights accurate and timely diagnosis based on ultrasound findings despite negative X-ray films. Orthopedic consultation and appropriate preparations for procedural sedation were made while awaiting repeat X-ray films, thus, ultimately saving time and reducing the chance of complications.

CONCLUSION

The role of bedside ultrasound of the hip for anterior hip dislocation is still to be further evaluated. Certainly, AP and lateral X-ray imaging studies are the gold standard radiographic tests in making this diagnosis, and we do not recommend replacement of X-ray studies with ultrasound for this presentation. However, the accurate diagnosis of hip dislocation in this patient despite initial misdiagnosis by posterior-anterior X-ray film demonstrates the potential use of this imaging modality. It supports ultrasound as an effective tool in situations where the clinical picture and the initial radiographic evaluation are incompatible. We are suggesting that there is a role for ultrasound in similar situations in which the X-ray study findings are equivocal or not in line with clinical findings.

Although it is difficult to predict what the patient’s outcome would have been had the ultrasound not been used, this case demonstrates that the benefits of ultrasonography, such as absence of radiation and bedside availability, can be applied to anterior hip dislocations. This report suggests the potential use of bedside ultrasonography in the evaluation of the adult hip in traumatic situations.

REFERENCES