

# Ultrasonography Facilitates the Diagnosis of Traumatic Iliopsoas Hemorrhage: A Report of Two Cases with Different Patterns

CME  
Credits

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## Abstract

We report two cases of traumatic iliopsoas hemorrhage, without hemoperitoneum, initially detected by ultrasound. Flexion hip contracture in the first case and incomplete femoral nerve palsy in the second case alerted the sonographer to the possibility of traumatic iliopsoas hemorrhage. The first case involved a 54-year-old man who complained of progressive right flank pain and difficulty in walking after falling to the ground. The second case involved a 34-year-old man who complained of severe lower back pain and numbness and weakness of the left leg after a motorcycle accident. In both cases, iliopsoas hemorrhage was confirmed on subsequent multidetector computed tomography.

**Keywords:** Hemorrhage, hip contracture, iliopsoas, nerve palsy, ultrasonography

## INTRODUCTION

Since its inception more than half a century ago, ultrasonography (US) has been used to noninvasively image abdominal pathology without the need for exposure to ionizing radiation.<sup>[1]</sup> With a quick scan method called focused assessment with sonography for trauma (FAST), a type of point-of-care US, internal bleeding with hemoperitoneum can be quickly detected in the trauma setting.<sup>[2]</sup> Due to the original design of FAST (which involves imaging for detection of intraperitoneal fluid), however, critical extraperitoneal bleeding cannot be adequately evaluated using the limited views available with this method. We report two cases of extraperitoneal hemorrhage without hemoperitoneum initially diagnosed on US.

## CASE REPORT

### Case 1

A 54-year-old man complained of progressive right flank pain and difficulty in walking after a fall to the ground while at home. Although he experienced immediate bilateral flank

pain, he was able to continue walking for 4 h after falling. He then presented to the emergency department of our hospital that same afternoon. The patient had a past medical history significant for hypertension controlled on medication and liver cirrhosis/portal hypertension secondary to hepatitis B virus and hepatitis C virus infections. He had a past surgical history significant for transpedicular screw placement for lumbosacral spondylolysis, a right total hip replacement, and percutaneous coronary intervention several years ago.

On physical examination, the patient was alert and oriented with a heart rate of 71 beats/min, blood pressure of 146/86 mmHg, respiratory rate of 16 breaths/min, and temperature of 36°C. The patient had a flexion hip contracture on the right side. His physical examination also revealed tenderness over the right abdomen. There was no skin wound, soft-tissue swelling, or neurological deficit involving either leg.

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Received: 11-01-2022 Revised: 04-02-2022 Accepted: 10-02-2022 Available Online: 03-05-2022

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DOI:  
[10.4103/jmu.jmu\\_4\\_22](https://doi.org/10.4103/jmu.jmu_4_22)

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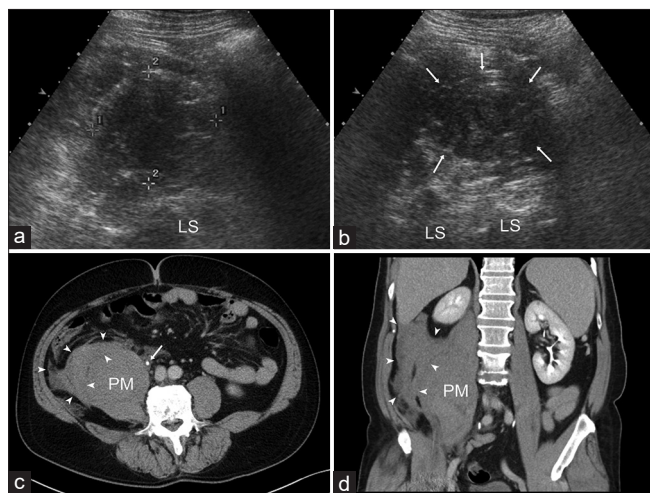
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**How to cite this article:** Tsai YT, Chen CA, Liang KW, Huang HH, Lee HL, Tyan YS, *et al.* Ultrasonography facilitates the diagnosis of traumatic iliopsoas hemorrhage: A report of two cases with different patterns. *J Med Ultrasound* 2023;31:51-4.

US was performed for the evaluation of blunt abdominal trauma. In the expected place of the right iliopsoas muscle, US revealed a large hypoechoic mass, without detectable vascularity on Doppler, within the right paravertebral area [Figure 1a and b]. US also showed coarse echogenicity of the liver and splenomegaly compatible with liver cirrhosis complicated by portal hypertension. There was no fluid within the peritoneal cavity.

Laboratory workup revealed a decreased hemoglobin level (11.1 g/dl; reference, 13–17 g/dl), low platelet count (44,000/ul; reference, 150,000–400,000/ul), elevated alanine aminotransferase, (92 IU/L; reference, 10–40 IU/L), elevated prothrombin time (14.5 s; reference, 8.0–12.0 s) with international normalized ratio of 1.35, normal white blood cell count (4680/ul; reference, 4,000–11,000/ul), creatinine level (0.70 mg/dl; reference, 0.64–1.27 mg/dl), and activated partial thromboplastin time, 33.2 s; reference, 25.4–36.0 s).

The diagnosis of iliopsoas hemorrhage was suspected and later confirmed by subsequent multidetector computed tomography (MDCT) [Figure 1c and d]. The patient was treated conservatively, and his vital parameters were closely monitored.



**Figure 1:** Right traumatic iliopsoas hemorrhage in a 54-year-old man with right flank pain and right flexion hip contracture after falling to the ground. (a) Transverse view on ultrasonography 5 h after a trauma, obtained at the level of the iliac crest, shows a large circumscribed mass within the right abdomen. The internal contents are predominantly hypoechoic. The normal right iliopsoas muscle is not visible. (b) Longitudinal view on ultrasonography reveals a predominantly hypoechoic lesion (arrows). (c) Transverse view on contrast-enhanced multidetector computed tomography of the abdomen, at the level of the umbilicus, reveals a hematoma within the swollen right psoas major muscle and the right retroperitoneal space (arrowheads). The hematoma also extended downward to the right iliacus muscle (not shown). Anteromedial displacement of the right ureter (arrow) by the hematoma is also noted. (d) Coronal view on contrast-enhanced multidetector computed tomography of the abdomen shows the hematoma within the swollen right psoas major muscle and within the right retroperitoneal space (arrowheads). There is no extravasation of contrast. LS: Lumbar spine, PM: Psoas major

His symptoms gradually improved without intervention, and he was discharged from the hospital 7 days later.

## Case 2

A 34-year-old male with no known history of systemic disease or inherited coagulopathy was sent to the emergency department of our hospital after a motorcycle accident. On arrival, he complained of severe lower back pain and numbness and weakness of the left leg.

On physical examination, the patient was alert and oriented with a heart rate of 79 beats/min, blood pressure of 130/89 mmHg, respiratory rate of 19 breaths/min, and temperature of 36.0°C.

Physical examination also revealed swelling and ecchymoses over the left lower back. There were multiple abrasions over both legs and shoulders. Range of movement of the left hip was mildly limited. Incomplete left femoral nerve palsy was noted. Laboratory data were unremarkable.

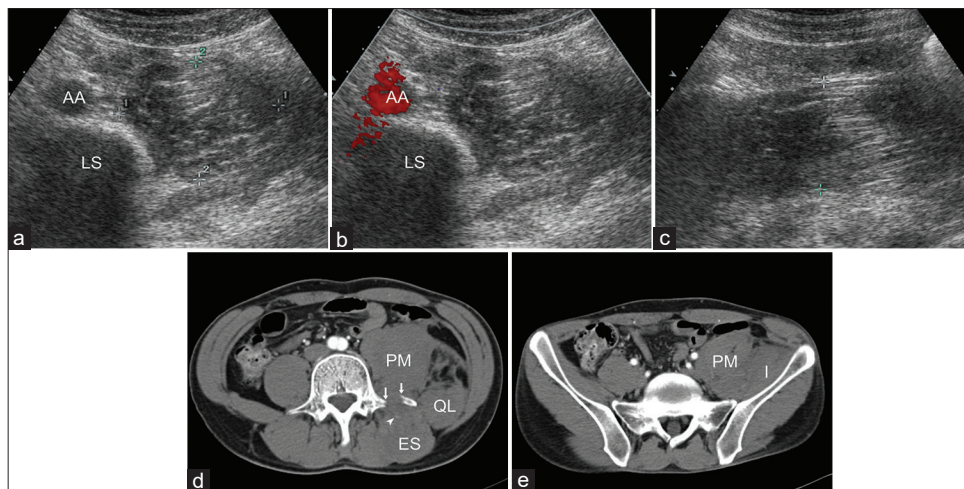
US was performed for evaluation of blunt abdominal trauma. On transverse view, fusiform enlargement of the left iliopsoas muscle with mixed echogenicity in a mosaic (starry) pattern was noted [Figure 2a]. There was no detectable flow within the swollen muscle on Doppler US [Figure 2b]. The longitudinal view showed multiple hyperechoic lines parallel to each other within the lesion [Figure 2c]. There was no fluid within the peritoneal cavity. Based on the ultrasonographic findings, the diagnosis of iliopsoas hemorrhage was established and confirmed by subsequent MDCT [Figure 2d and e]. MDCT also revealed fractures of the left transverse processes of T12–L4 vertebrae.

The patient was treated conservatively, and his vital parameters were closely monitored. The lower back pain gradually remitted. The femoral nerve palsy recovered within 48 h, and he was discharged from the hospital 5 days later. No sequela was noted at follow-up in our outpatient department.

## DISCUSSION

The main causes of iliopsoas hemorrhage include hemophilia,<sup>[3–6]</sup> anticoagulant therapy,<sup>[5,7–9]</sup> and trauma.<sup>[5,10–13]</sup> The underlying mechanism of traumatic iliopsoas hemorrhage is thought to involve muscle strain due to abrupt excessive extension of the hip joint.<sup>[11]</sup> This mechanism is supported by the patient's clinical presentation in Case 1. In Case 2, although there was no direct evidence, the fractured left transverse processes of T12–L4 vertebrae may have injured the adjacent soft tissues and led to the iliopsoas hemorrhage.

Patients with iliopsoas hemorrhage can present with back, thigh, hip, and/or groin pain with or without a palpable intra-abdominal mass. They also frequently manifest with a characteristic symptom of flexion hip contracture.<sup>[3,4,6]</sup> In Case 1, the symptom of flexion hip contracture alerted the sonographer to evaluate for possible ipsilateral iliopsoas muscle hematoma. As the femoral nerve travels between the psoas and iliacus muscles in its descent to the lower



**Figure 2:** Left traumatic iliopsoas hemorrhage in a 34-year-old man with severe low back pain and incomplete left femoral nerve palsy after a motorcycle accident. (a) Transverse view on ultrasonography 9 h after a trauma, obtained at the level just above the iliac crest, shows fusiform enlargement of the left iliopsoas muscle with mixed echogenicity in a mosaic (starry) pattern. (b) The corresponding color Doppler image, obtained with a color velocity setting of 27 cm/s, demonstrates no detectable blood flow within the lesion. (c) Longitudinal view on ultrasonography reveals multiple hyperechoic lines parallel to each other within the lesion pathognomonic for muscular hemorrhage after trauma. (d) Transverse view on contrast-enhanced multidetector computed tomography of the abdomen, obtained at the level of the aortic bifurcation, reveals a hematoma within a swollen left psoas major as well as hematoma of the left quadratus lumborum and erector spinae muscles. Fracture of the left transverse process of L4 vertebra (arrows) is also shown. Note the minimal contrast medium extravasation (arrowhead) close to the fractured bone. (e) Transverse view on contrast-enhanced multidetector computed tomography of the pelvis reveals downward extension of the hematoma into the left iliacus (I) muscle. AA: Abdominal aorta, LS: Lumbar spine, PM: Psoas major

extremity, iliopsoas muscle swelling may cause pressure on the femoral nerve and lead to femoral nerve palsy involving alternations in both motor and sensory functions.<sup>[6,7,9,10,12]</sup> If this palsy (especially the motor deficit) develops, US -guided hematoma drainage or surgery may be indicated within 48 h.<sup>[7]</sup> Fortunately, the incomplete femoral nerve palsy in Case 2 improved with conservative treatment.

Takebayashi *et al.*<sup>[14]</sup> described the pattern of the muscular hemorrhage on US and reported the following three types of muscle strain injury of the lower extremities: (1) a mass; (2) hyperechoic infiltration; and (3) a compound lesion involving both infiltration and a mass. If the muscular hemorrhage aggregates, the lesion can appear circumscribed, as in Case 1, and the internal echogenicity might vary depending on the stage of liquefaction within the hematoma. In a case with unclear clinical presentation, the differential diagnosis for this ultrasonographic appearance includes retroperitoneal abscess and neoplasm.

On the other hand, if the extravasated blood dissected the muscle fascicles rather than form a collection between muscular bundles, as in Case 2, the affected muscle would show swelling with hyperechoic infiltration. Diffuse swelling of the iliopsoas muscle can be diagnosed without difficulty on US. However, less severe swelling of the muscle can sometimes only be detected by comparison with the contralateral normal side.<sup>[3]</sup> An accurate diagnosis is achieved once the pathognomonic ultrasonographic appearance of muscle swelling is found. However, a negative finding is insufficient to exclude such swelling, as the iliopsoas muscles

can be obscured by bowel gas or may be too deep to be scanned in some cases. In such cases, computed tomography should be considered.<sup>[5]</sup>

As the iliopsoas hematoma is located outside the peritoneal cavity, intraperitoneal fluid (hemoperitoneum) is typically not present. A negative FAST scan with limited views, therefore, cannot exclude an iliopsoas hematoma. Thus, the history and physical examination play a vital role in the setting of blunt abdominal trauma and suspected iliopsoas hematoma. The characteristic flexion hip contracture or femoral nerve palsy serves as red flags to the astute sonographer to search more carefully for an underlying cause, as in our two cases.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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