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When flank pain leads to fainting: a case of a ruptured angiomyolipoma diagnosed by point-of-care ultrasound

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Abstract

Background Acute flank pain is a common presentation in the Emergency Department (ED). Point-of-care ultrasound (PoCUS) has emerged as an invaluable tool in the evaluation of acute flank pain and provides real-time images resulting in the early identification of the underlying pathology.

Case Report Here we report a case of a young lady presented to the ED with a complaint of right flank pain followed by a syncopal episode. The diagnosis of ruptured angiomyolipoma was made using a PoCUS and an immediate consult to interventional radiology and urology was provided.

Conclusion This case highlights the importance of PoCUS in assessing patients presented to the ED with acute flank pain. Its incorporation into clinical practice promises to revolutionize the approach to renal emergencies, emphasizing its important role in delivering timely and effective care.

Keywords Flank pain, Angiomyolipoma, Emergency department

Background

Acute flank pain is a common presentation in the Emergency Department (ED). The diagnosis is often challenging and requires a comprehensive approach due to a wide range of underlying causes, from renal calculi and urinary tract infections to more unusual entities such as vascular anomalies or neoplasms [1].

Point-of-care ultrasound (PoCUS) has emerged as an invaluable tool in the evaluation of acute flank pain in the ED. It provides real-time images at the bedside resulting in the early identification of the underlying pathology [2]. The addition of PoCUS to the clinical examination also allows clinicians to accurately identify the underlying etiology of acute flank pain, thereby informing timely and tailored patient management strategies [3].

Here, we present a case of a middle-aged woman who presented to the ED with acute flank pain followed by syncope. PoCUS was used to rapidly identify the diagnosis of ruptured renal angiomyolipoma, which resulted in immediate management and a referral for inpatient urology care.

Case presentation

A 45-year-old woman presented to the ED with a complaint of sudden onset of right flank pain. There was also a history of sweating, lightheadedness, and fainting. The patient was sitting on a chair and the event was witnessed by the family members. The patient recovered within a minute and was brought to the ED by emergency medical services (EMS). There was no history of fever, vomiting, falls, or urinary tract symptoms. The family did not

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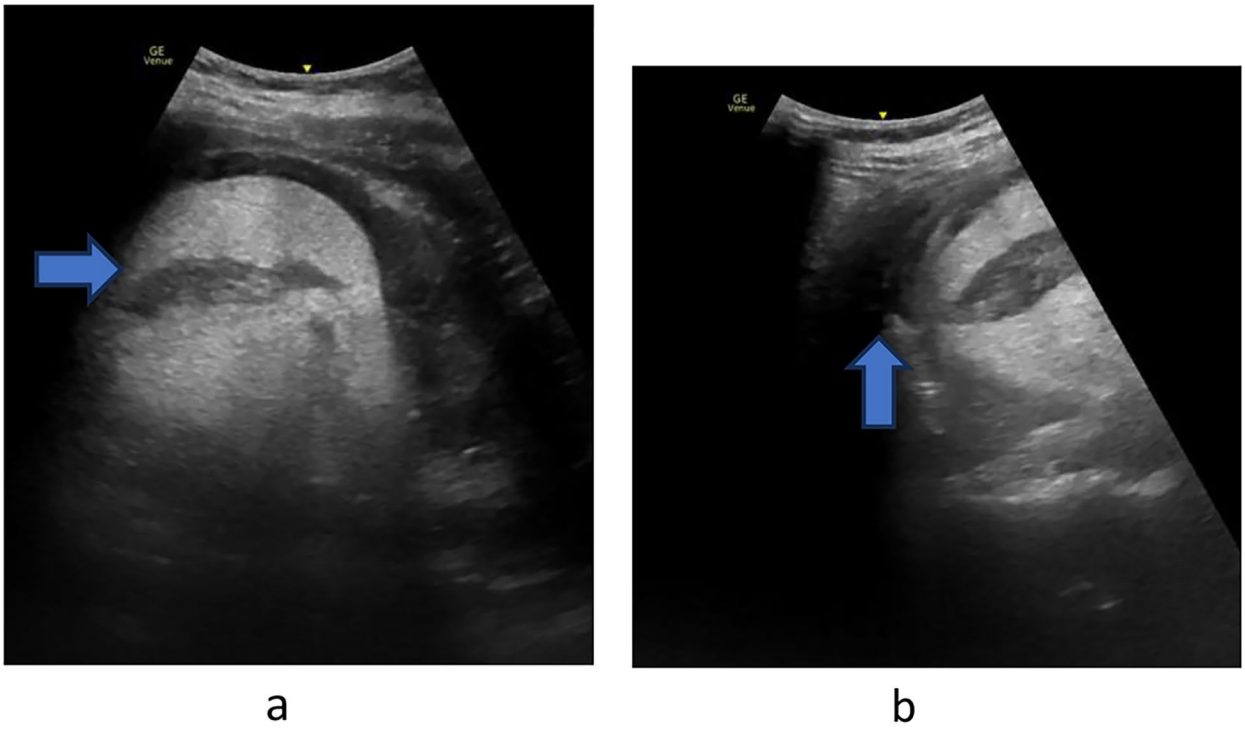

Fig. 1 **a** Hyperechoic heterogeneous mass arising from the upper pole of the right kidney (arrow). **b** Hypoechogenicity around the upper pole of the kidney suggestive of hematoma (arrow)

notice any jerky movements or post-event confusion. Her past medical history was only significant for type 2 diabetes. Her medications included Semaglutide. On examination, her vitals were, pulse 88/min, blood pressure 115/75 mmHg, respiratory rate 18/min, and temperature 36.4 C. Her abdomen was soft with mild tenderness in the right flank and costovertebral angle. The rest of the clinical examination was unremarkable. Initial laboratory workup showed a hemoglobin of 13.3 gm/dl, and a raised total leukocyte count of 15.6×10^9/L with neutrophilic

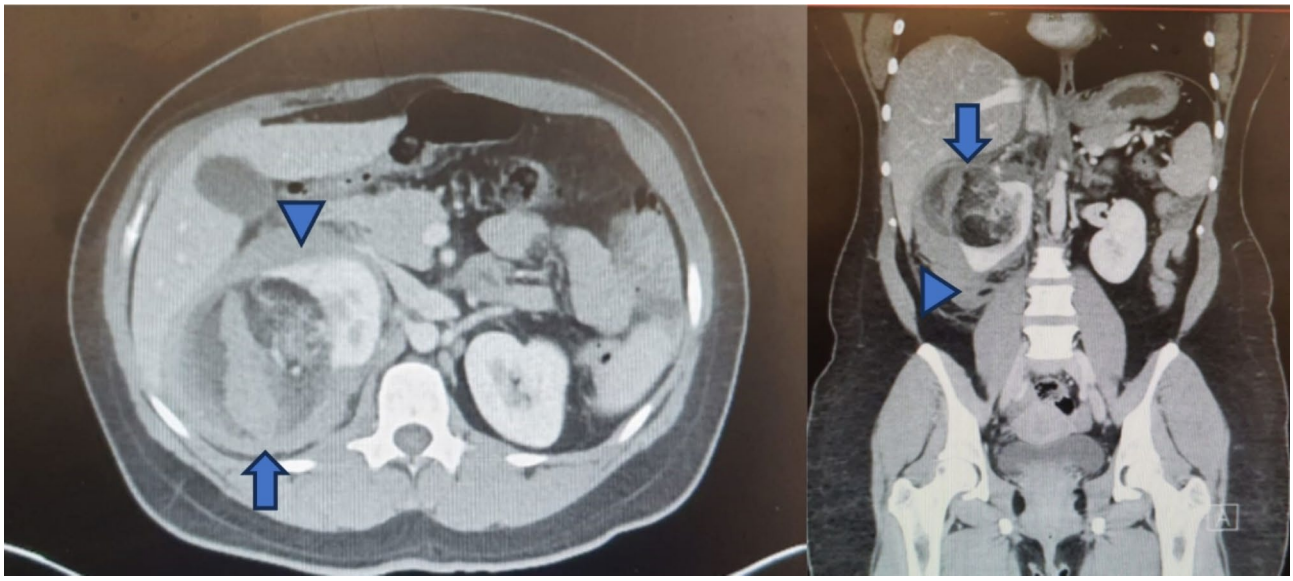

Fig. 2 Axial and coronal view of CT-Scan abdomen showing heterogeneous mass arising from the upper pole of the right kidney (arrow) with surrounding hematoma (arrowhead)

shift. The urinalysis was positive for red blood cells and hemoglobinuria.

The treating emergency physician performed the PoCUS. A low-frequency curvilinear array transducer with an abdominal preset was selected and placed longitudinally at the right posterior-axillary line. A hyperechoic heterogeneous mass was visualized arising from the upper region of the right kidney. Furthermore, an anechoic region was also identified surrounding the right kidney suggestive of free fluid (Fig. 1a and b). An urgent CT abdomen was ordered that demonstrated a large heterogenous, exophytic right renal mass located in the mid and upper right kidney. The mass contained fat-density elements as well as soft tissue and prominent vessels suggestive of angiomyolipoma (AML). There was also a large perinephric hematoma suggestive of tumor bleed (Fig. 2).

A consultation was sought from both the urology and interventional radiology services. The interventional radiologist conducted an angioembolization for the ruptured AML. Subsequently, the patient was admitted under the urology service for monitoring of hemoglobin levels. The patient's hemoglobin levels remained stable and she didn't require any blood product transfusion. Following three days of hospitalization, the patient was discharged with a prescription for oral analgesics and made an uneventful recovery.

Discussion

Angiomyolipomas are the most common benign renal neoplasms and are comprised of varying proportions of adipose tissue, smooth muscle cells, and blood vessels. They are typically found incidentally in imaging studies but may present with symptoms such as flank pain,

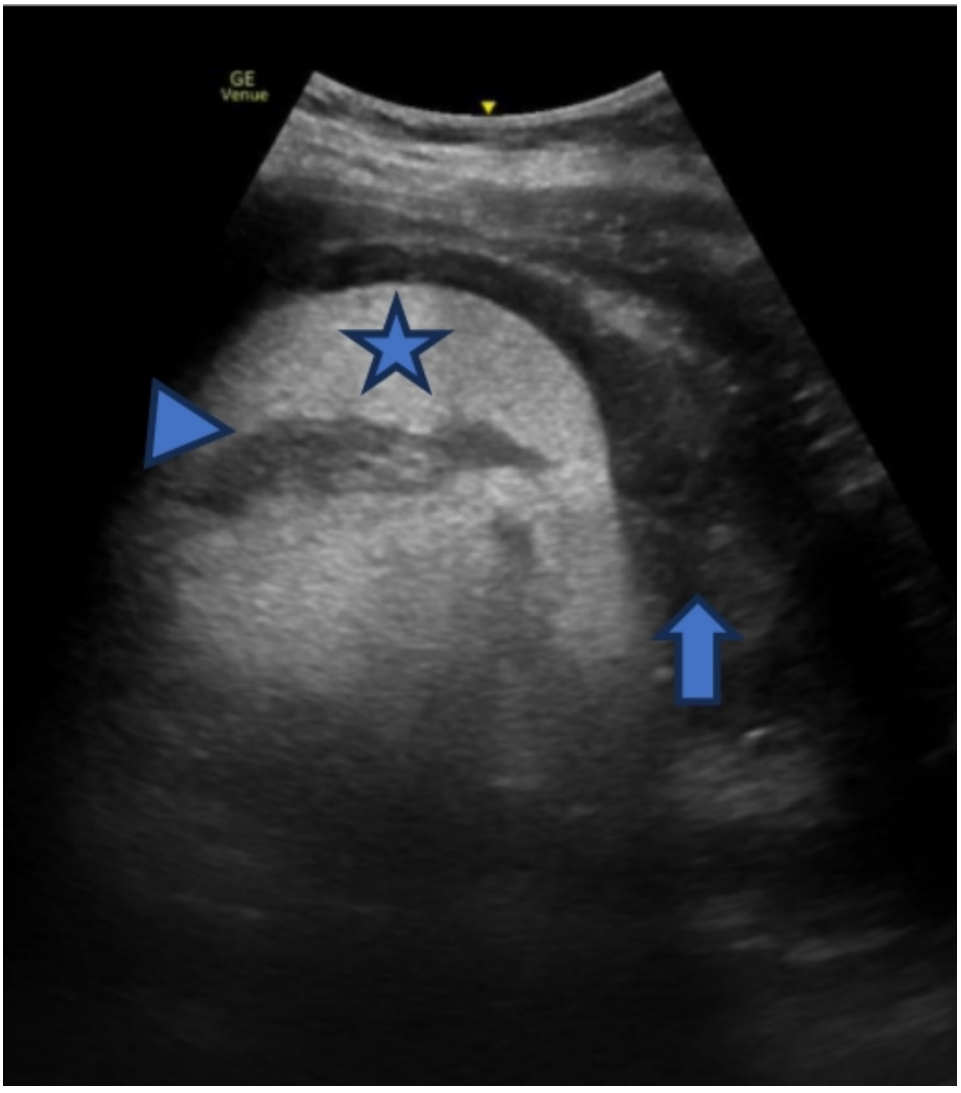

Fig. 3 Exophytic mass arising from the upper pole of the right kidney (arrow) showing hypoechoic smooth muscle (arrowhead) surrounded by hyperechoic fat (star)

hematuria, or in rare cases, rupture leading to hemorrhagic shock [4].

Diagnosing AML and its complications, particularly rupture, requires a comprehensive approach involving clinical evaluation, laboratory investigations, and imaging modalities. Although CT scan is often considered the first imaging modality for the diagnosis of AML [5], it has some limitations due to overlapping features with other renal masses, radiation exposure, and contrast-related complications.

PoCUS is a valuable tool in the rapid assessment of patients with renal pathology. It offers real-time visualization without radiation exposure and can provide crucial information about the presence of masses, free fluid, or signs of rupture [6]. The scan should be performed with the patient lying supine. A low-frequency curvilinear array transducer should be selected with an abdominal or renal preset. The transducer should be placed longitudinally over the posterior axillary line at the level of the xiphisternum to identify the kidney. The transducer should be swept anteriorly and posteriorly to identify any free fluid. Then the operator should rotate the transducer 90 degrees and evaluate the kidney in the transverse view. Typical features of AML include a well-defined structure surrounded by renal parenchyma with variable echogenicity due to the presence of fat and other tissues such as blood vessels and smooth muscles [7] (Fig. 3, Supplementary file, Video 1). In this case, PoCUS revealed a hyperechoic heterogeneous mass arising from the upper part of the right kidney, along with surrounding hypoechogenicity suggestive of free fluid, indicative of hematoma secondary to rupture.

Limited evidence exists regarding the use of ultrasound for diagnosing ruptured AML in the ED. A study conducted by Sapadin et al. reported a case where the US detected a ruptured AML, resulting in hemorrhagic shock in a young girl [8]. Another study by T. Zhang et al. from the ED documented a case of spontaneous rupture of renal AML in a pregnant woman [9]. In our patient, the PoCUS rapidly identified the ruptured AML resulting in rapid referral to interventional radiology and urology for definitive management.

Conclusion

This case underscores the relevance of emergency physicians' expertise in managing patients with syncope associated with undifferentiated abdominal pain. The presentation of sudden onset of flank pain, syncope, and subsequent PoCUS findings revealing a ruptured angiomyolipoma necessitated urgent confirmatory imaging and multidisciplinary collaboration. The prompt interpretation of imaging findings, coordination with urology and interventional radiology, and timely intervention through angioembolization exemplify essential skills in acute care and decision-making within emergency medicine.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12245-024-00733-y.

Supplementary Material 1

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NA- Conceptualization, writing, reviewing, and editing original draft. MM-reviewing, and editing final draft JC- Writing, reviewing, and approval of final draft. All authors have reviewed the manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
I hereby certify that the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Approval for ERC has been applied at **Research Ethics Board (REB) of Sunnybrook Health Sciences Centre**. Written informed consent to participate was obtained from patient.

Consent for publication
Informed consent was also obtained from patient.

Competing interests
The authors declare that they have no competing interests.

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