

## Emergency ultrasound diagnosis of a ruptured angiomyolipoma causing acute anemia

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**Abstract** A 32-year-old female presented with acute, asymptomatic anemia. While vital signs and physical examination were stable and non-diagnostic, utilizing goal-directed bedside ultrasound, a perinephric hematoma consistent with a ruptured angiomyolipoma was discovered as the cause of the patient's condition.

**Keywords** Emergency · Ultrasound · Kidney · Angiomyolipoma · Perinephric hematoma · Anemia

### Case report

A 32-year-old female with a history of diabetes mellitus, hypertension, hepatitis C, and a recent hospital admission for right foot osteomyelitis was referred to the emergency department from a rehabilitation facility for altered mental status and possible hypoglycemia. On presentation, the patient's mental status was at baseline and the patient denied any complaints. Vital signs and point-of-care glucose were within normal limits, and physical examination was grossly unremarkable. Basic laboratory tests were sent and the patient was observed.

Initial laboratory results were significant only for a hemoglobin and hematocrit of 8 g/dL and 25%, respectively, a change from levels of 14 g/dL and 40% 1-month

prior. The patient's physical examination remained non-focal, stool examination revealed no occult blood, no microscopic blood was noted in the urinalysis, and vital signs were stable. The emergency physician performed a goal-directed bedside ultrasound examination to screen for any free fluid as a cause for the acute anemia, using a 5–2 MHz curvilinear array transducer (Model HD11XE, Philips, Andover, MA, USA). While no free fluid was noted, on viewing the splenorenal space a non-homogenous structure of mixed echogenicity was noted contiguous with the left kidney (Fig. 1a, b; Online Resource 1). An abdominal computed tomography (CT) scan was performed to further define the structure, and revealed a large perinephric hematoma consistent with a ruptured angiomyolipoma (Fig. 2) that was not present on a previous CT scan 3 months prior (Fig. 3). The patient underwent a renal angiogram by interventional radiology, which revealed a hematoma with no further active bleeding.

### Discussion and conclusion

Renal angiomyolipomas are benign neoplasms composed of fat, smooth muscle, and blood vessels. When large (over 4 cm) they have a higher propensity to bleeding, and secondary to even minor trauma, can lead to intratumoral or retroperitoneal hemorrhage [1], rarely intraperitoneal hemorrhage [2], and ultimately hemorrhagic shock. Angiomyolipomas usually appear hyperechoic on ultrasound due to their high fat content, though they may appear hypoechoic in areas where smooth muscle or vessels are more prevalent or if intratumoral hemorrhage is present [3].

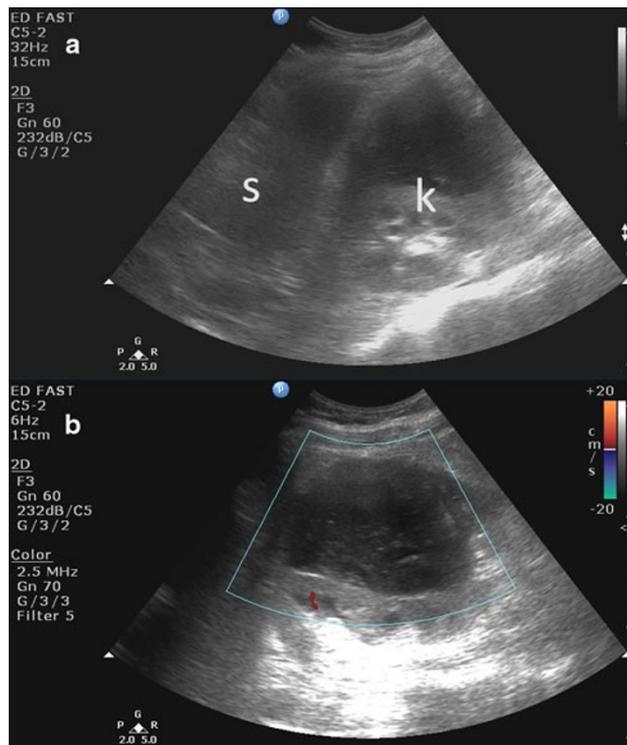
Goal-directed bedside ultrasound in this case led to the patient's ultimate diagnosis. In light of a benign physical exam and normal vital signs, without emergency

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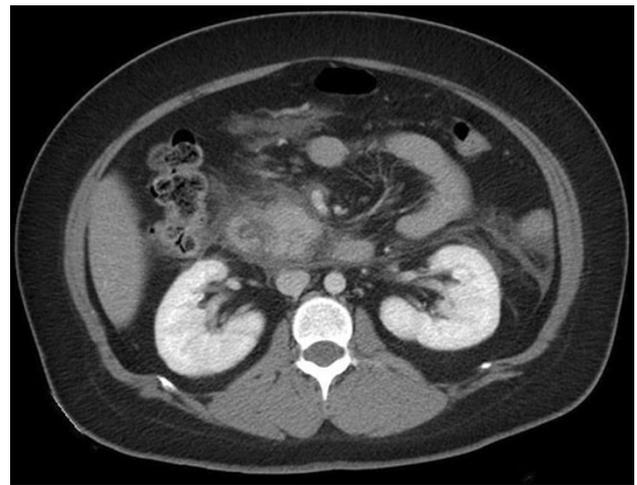
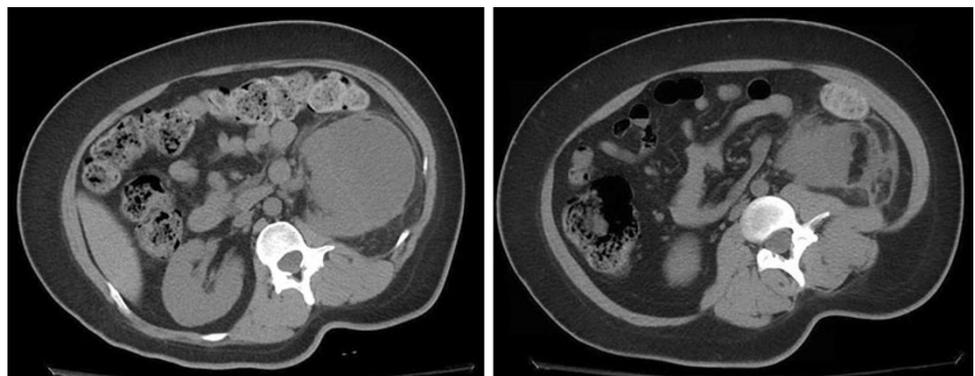
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**Fig. 1** **a** Sonographic perisplenic window, coronal plane; (s: spleen, k: kidney). Note the mixed echogenicity in the upper portion of the left kidney in this image. **b** Perisplenic window, coronal plane of predominately the left kidney

ultrasound the patient would likely have been admitted for a hematologic evaluation with an undiscovered ruptured angiomyolipoma. While the intent was to investigate for free intraperitoneal fluid as in a Focused Assessment with Sonography for Trauma (FAST) examination, it is helpful to be aware of other pathologies that may be visualized in

**Fig. 2** Images from a CT scan of the abdomen revealing a large left perinephric hematoma, as well as a fat containing lesion at the inferior pole of the left kidney that is consistent with a ruptured angiomyolipoma



**Fig. 3** Image from a CT scan of the abdomen 3 months prior to presentation

acute intraabdominal hemorrhage, such as solid organ injury or retroperitoneal free fluid. Solid organ injuries may be detected even without sonographic evidence of hemo-peritoneum [4]. Specific to the kidney, hypoechoic areas may represent parenchymal hemorrhage and edema [5]. Hypoechoic areas surrounding the kidney suggest acute hemorrhage or a hematoma. These findings contrast with anechoic collections of fluid within the collecting system, as seen with hydronephrosis, or circumscribed anechoic collections located within the cortex, which are consistent with renal cysts. When visible, retroperitoneal free fluid may appear as an anechoic or hypoechoic area surrounding the kidney. It may also appear as an anechoic collection deep to Gerota's fascia, which together with perinephric fat is visualized as an echogenic line that outlines the renal cortex.

**Conflict of interest** None.

## References

1. Wang HB, Yeh CL, Hsu KF (2009) Spontaneous rupture renal angiomyolipoma with hemorrhagic shock. *Int Med* 48:1111–1112
2. Abdellaoui A, Al-Daraji W, Natarajan V, Sandilands D (2006) Spontaneous renal haemorrhage in the peritoneal cavity. *Postgrad Med J* 82:e14
3. Lorenzo ED, Zappasodi F, Busilacchi P, Neumaier CE (1985) Spontaneous rupture of renal angiomyolipoma with perinephric haemorrhage: sonographic findings. *Br J Radiol* 58:979–982
4. Brown MA, Casola G, Sirlin CB, Hoyt DB (2001) Importance of evaluating organ parenchyma during screening abdominal ultrasonography after blunt trauma. *J Ultrasound Med* 20:577–583
5. Noble VE, Brown DFM (2004) Renal ultrasound. *Emerg Med Clin N Am* 22:641–659