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The Clinical Picture
Bilateral adrenal masses

FIGURE 1

FIGURE 2

A 68-year-old woman presented to the emergency department with constipation and abdominal pain 13 days after left hip arthroplasty. Abdominal computed tomography (CT) revealed possible bowel obstruction, left renal infarction, and a thrombus in the abdominal aorta near the left renal artery (**FIGURE 1**).

Because of the aortic thrombus, anticoagulation with intravenous heparin and with warfarin (Coumadin) was started. Three days later, her platelet count decreased to 54 × 10^9/L (reference range 150–400), her serum creatinine rose to 2.38 mg/dL (0.70–1.40), sodium was stable at 131 mmol/L (132–148), and potassium was 4.1 mmol/L (3.5–5.0).

Physical examination revealed a temperature of 100.2°F (37.9°C), blood pressure 110/59 mm Hg, pulse 100 bpm, and no abdominal pain on palpation. Renal ultrasonography revealed a mass (2.4 × 2.1 × 3.6 cm) above the right kidney. Abdominal CT without contrast showed bilateral high-density adrenal masses (**FIGURE 2**).

Q: Which is the most likely diagnosis?
- ☐ Metastasis to the adrenal glands
- ☐ Adrenal adenoma
- ☐ Pheochromocytoma
- ☐ Adrenal cortical carcinoma
- ☐ Adrenal gland hemorrhage

A: The correct diagnosis is adrenal gland hemorrhage.

Acute or subacute hemorrhage typically results in an oval hyperdense mass with an attenuation of 50 to 90 Hounsfield units (H) on noncontrast CT (**FIGURE 2**),[1,2] and this attenuation does not increase with the use of contrast.[2]

In contrast, adrenal cortical carcinoma typically appears as a large heterogeneous

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mass, with some lesions demonstrating central necrosis or calcification. Pheochromocytoma is well defined, with intense enhancement after contrast is given. Adenoma is usually homogenous, with well-defined margins. Many adenomas have increased intracytoplasmic lipid content and, therefore, will have an attenuation of less than 10 H or will demonstrate rapid washout of contrast. Metastasis to the adrenal gland may not have a characteristic radiographic appearance but typically has a slower contrast washout rate than adenoma.[1]

This patient's initial abdominal image showed normal-appearing adrenal glands, thus making adenoma, adrenal metastasis, pheochromocytoma, and adrenal cortical carcinoma unlikely.

The patient's baseline cortisol level, a random afternoon reading, was 0.4 µg/dL (reference range 3.4–26.9), and a 1-hour cortrosyn-stimulated cortisol was 0 µg/dL, which is diagnostic of primary adrenal insufficiency in the context of this clinical setting. She received hydrocortisone and fludrocortisone, and 8 AM cortisol measurements 3 weeks and 5 months later, after the patient was off hydrocortisone for 24 hours, remained undetectable.

In patients without risk factors, look for an adrenal neoplasm or cyst

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1. **Dunnick NR, Korobkin M**. Imaging of adrenal incidentalomas: current status. AJR Am J Roentgenol 2002; 179:559–568.
2. **Kawashima A, Sandler CM, Ernst RD, et al**. Imaging of nontraumatic hemorrhage of the adrenal gland. Radiographics 1999; 19:949–963.

The diagnosis of adrenal hemorrhage can be difficult because the symptoms can be nonspecific and attributable to other clinical factors. In a review of 141 patients with adrenal hemorrhage,[3] only 19% of patients with bilateral adrenal hemorrhage developed hypotension with a systolic blood pressure less than 90 mm Hg, only 15% developed hyponatremia (sodium < 130 mmol/L), and only 24% developed hyperkalemia (potassium > 5 mmol/L).[3]

If unrecognized, adrenal insufficiency from adrenal hemorrhage is fatal. Abdominal CT or magnetic resonance imaging can diagnose adrenal hemorrhage. Adrenal function may recover (although it did not in this patient), and a morning cortisol level should be obtained to reevaluate adrenal function.[3]

Risk factors for adrenal hemorrhage include anticoagulation therapy, sepsis, surgery, hypotension, and coagulopathy as seen in heparin-induced thrombocytopenia and disseminated intravascular coagulation. This patient had coagulopathy, as evidenced by her abdominal aortic thrombus, for which she was placed on anticoagulation. Patients without these risk factors for adrenal gland hemorrhage should be investigated for an underlying adrenal neoplasm or cyst.[2]

3. **Vella A, Nippoldt TB, Morris JC 3rd**. Adrenal hemorrhage: a 25-year experience at the Mayo Clinic. Mayo Clin Proc 2001; 76:161–168.

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