

EMERGENCY IMAGING

Petro Kostandy, Anup Parikh, MD, Ashwin Asrani, MD, and Keith D. Hentel, MD

FIGURE 1



FIGURE 2



A 72-year-old woman with a history of coronary artery disease, diabetes, and hypertension presents to the ED with increasing shortness of breath and fatigue. She underwent elective percutaneous coronary angioplasty 2 days earlier. Her lab results are remarkable for a new elevation in serum creatinine, from 1.50 to 2.05 mg/dL, and a drop in hemoglobin, from 9.2 to 7.6 g/dL. Noncontrast CT of the abdomen and pelvis is performed. An axial section (Figure 1) and a coronal section (Figure 2) are shown.

What is your diagnosis?

Mr. Kostandy is a medical student at Weill Cornell Medical College in Qatar. **Dr. Parikh** is an instructor of clinical radiology at Weill Cornell Medical College in New York City and an assistant attending radiologist at NewYork-Presbyterian Hospital/Weill Cornell Medical Center in New York City. **Dr. Asrani** is an assistant professor of radiology at Weill Cornell Medical College in New York City and an assistant attending radiologist at NewYork-Presbyterian Hospital/Weill Cornell Medical Center. **Dr. Hentel**, editor of "Emergency Imaging," is an associate professor of clinical radiology at Weill Cornell Medical College in New York City. He is also chief of emergency/musculoskeletal imaging and the vice-chairman for clinical operations for the department of radiology at NewYork-Presbyterian Hospital/Weill Cornell Medical Center. He is a member of the EMERGENCY MEDICINE editorial board.

CONTINUED

FIGURE 3

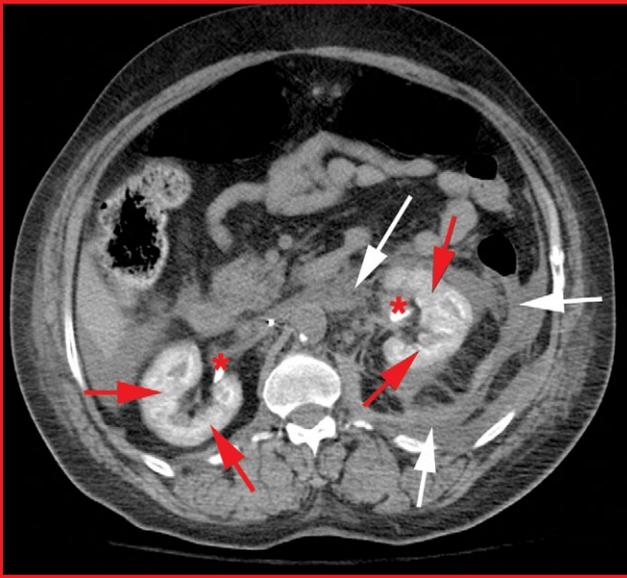


FIGURE 4



ANSWER

The images demonstrate two important diagnoses. There is high-density fluid seen in the retroperitoneum (white arrows, Figures 3 and 4). This is consistent with a retroperitoneal hematoma, which explains the sudden drop in the patient's hemoglobin level. Retroperitoneal hematoma is a known complication of catheterization through the groin. There is also bilateral renal parenchymal enhancement (red arrows) and contrast within the renal pelvis and collecting system (red asterisks, Figures 3 and 4). This CT was performed without contrast; therefore, the contrast in the renal parenchyma and collecting system is identified as persistent contrast material from the previous cardiac catheterization. The typical half-life of iodinated contrast in the body is less than 60 minutes. In a patient without preexisting renal failure, this delayed enhancement of the kidneys suggests contrast-induced nephropathy (CIN). Figure 5, a second coronal image from the same study, again demonstrates the retroperitoneal hematoma (white arrows), as well as dense contrast within the gallbladder (red asterisk). In patients with decreased renal function, contrast may be excreted by the biliary system, a process known as vicarious excretion of contrast.

CIN is most commonly defined as acute renal impairment associated with a rise in serum creatinine of at least 0.5 mg/dL, or a 25% increase from baseline, occurring within 48 hours of iodinated contrast exposure. It is thought to be the result of contrast-induced vasoconstriction in the renal medulla with subsequent ischemia. There is also evidence to suggest that iodinated contrast may have a direct cytotoxic effect on renal tubular cells.¹ Most cases of CIN are reversible, and serum creatinine levels generally peak within 3 to 5 days and return to baseline within 7 to 14 days. There is a risk of acute renal failure requiring dialysis, however, and although severe CIN is rare, it has been associated with an increase in mortality.^{2,3}

Risk factors for CIN include diabetes, chronic kidney disease, congestive heart failure, hypertension, acute hypotension requiring an intra-aortic balloon pump, ST-segment elevation myocardial infarction, hypovolemia, and increasing age. The incidence of CIN has

been reported to be around 1% to 6% in unselected patient groups, though it can be as high as 50% in high-risk groups, particularly those undergoing percutaneous coronary interventions (PCIs).⁴ This is to be expected, given that these patients tend to have a worse risk profile for CIN; in addition, higher volumes of contrast are used during PCI procedures.

Numerous strategies have been suggested to prevent or reduce the incidence of CIN. The only strategies consistently shown to be beneficial are IV hydration with normal saline, using low-osmolar contrast media, and minimizing the dose of contrast administered.⁵

The patient was admitted to the hospital. On follow-up CT performed 2 days later, the residual contrast was nearly completely cleared from the kidneys, and the size of the retroperitoneal hematoma was unchanged. Renal function eventually returned to normal. **EM**

REFERENCES

1. Quintavalle C, Brenca M, De Micco F, et al. In vivo and in vitro assessment of pathways involved in contrast media-induced renal cells apoptosis. *Cell Death Dis.* 2011;2:e155.
2. Levy EM, Viscoli CM, Horwitz RI. The effect of acute renal failure on mortality. A cohort analysis. *JAMA.* 1996;275(19):1489-1494.
3. Heitmeyer C, Hölscher B, Fobker M, et al. Prognostic value of different laboratory measures of renal function for long-term mortality after contrast media-associated renal impairment. *Clin Cardiol.* 2010; 33(12):E51-E59.
4. Waybill MM, Waybill PN. Contrast media-induced nephrotoxicity: identification of patients at risk and algorithms for prevention. *J Vasc Interv Radiol.* 2001;12(1):3-9.
5. Ellis JH, Cohan RH. Reducing the risk of contrast-induced nephropathy: a perspective on the controversies. *AJR Am J Roentgenol.* 2009; 192(6):1544-1549.

FIGURE 5



tion of patients at risk and algorithms for prevention. *J Vasc Interv Radiol.* 2001;12(1):3-9.

5. Ellis JH, Cohan RH. Reducing the risk of contrast-induced nephropathy: a perspective on the controversies. *AJR Am J Roentgenol.* 2009; 192(6):1544-1549.

What do you think?

Do you have something to say about anything you've read in *Emergency Medicine*? Send your comments to emergency.medicine@qhc.com

Once submitted, letters become the property of EM and may be published in a future issue.

