Abdominal Aortic Aneurysm and Dissection of the Left Internal Carotid Artery

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A 75-year-old man with coronary artery disease presents to the emergency department with abdominal pain and light-headedness. The pain began as a dull ache 4 days earlier and recently became considerably worse. The patient denies recent trauma, fever, nausea, vomiting, and diarrhea.

1. Abdominal pain in an older man with heart disease A 75-year-old man with coronary artery disease presents to the emergency department with abdominal pain and light-headedness. The pain began as a dull ache 4 days earlier and recently became considerably worse. The patient denies recent trauma, fever, nausea, vomiting, and diarrhea. Three years ago he had a small myocardial infarction. Since then he has had recurrent bouts of atrial fibrillation; pacer leads were placed to control the rhythm. He drinks alcohol occasionally but has never smoked. The patient is moderately obese and slightly lethargic. Temperature is 37.2°C (99°F); heart rate, 103 beats per minute; respiration rate, 19 breaths per minute; and blood pressure, 98/56 mm Hg. Heart rhythm and breath sounds are normal. Examination of the abdomen reveals acute tenderness at the midline and a faintly palpable pulsatile mass (although palpation is impeded by the patient's body habitus). Pulses in the extremities are tachycardic. You order frontal and lateral radiographs of the abdomen. What abnormality is evident, and how will you proceed to nail down the diagnosis?

1. Abdominal pain in an older man with heart disease: The bowel gas pattern seen in the frontal abdominal radiograph is unremarkable (A, yellow arrows); however, there is a curvilinear calcification at the midline that extends to the right and left of the vertebral column (A, black arrow). This is more visible on a high-resolution view of the region (B, arrows). The lateral radiograph confirms that this calcification is in the posterior section of the abdomen, in the normal location of the abdominal aorta (C, arrows). You order a CT scan of the abdominal aorta. While the scan is being performed, the patient's abdominal pain abruptly worsens. Two images at the level of the lower pole of the left kidney reveal an abdominal aortic aneurysm (D and E, yellow arrows) with a large amount of surrounding hemorrhage, which is likely the result of a leak. A small rent in the right side of the wall of the abdominal aorta is also visible (D and E, black arrows); contrast material can be seen escaping through the rent, which indicates active hemorrhage. A more inferior image (F) shows the common iliac arteries to be of normal caliber (arrows)--evidence that the abdominal aortic aneurysm has spared these vessels. In addition, a large amount of fluid can be seen within the retroperitoneum at this level. A delayed image at the level of the inferior abdominal aorta shows intra-arterial contrast extravasated into the retroperitoneum to the right of the aorta (G, arrow). This confirms active hemorrhage. A large, bleeding abdominal aortic aneurysm is diagnosed.

Outcome of this case. The patient underwent emergency surgery to repair the aneurysm. He survived the operation but died 3 days later as a result of bowel ischemia (which was believed to be secondary to hypotension that developed while he was en route to surgery).

2. Right-sided weakness following a soccer accident A 35-year-old woman has had neck pain, headache, and lethargy since she collided with another player during a soccer game 3 days earlier. She hit the other player on her right side while running at full speed; on impact, her head and neck rotated abruptly to the left. Following the injury, she went to the emergency department, where radiographs of the cervical spine were obtained and interpreted as normal. The patient has smoked 1 pack of cigarettes daily for the past 16 years; she also uses oral contraceptives. Although the patient has mild difficulty in moving the extremities on her right side, she is able to walk unassisted. Heart, lungs, and abdomen are normal. Cranial nerves are intact. Pupils are equal and reactive, and there is no cervical adenopathy. The right arm and leg are somewhat weaker than the left ones. There is also less sensation in the right extremities than in the left. You suspect an intracranial injury and order a CT scan of the head. What do these images reveal about the extent of the patient's injury--and what further investigation is warranted?

2. Right-sided weakness following a soccer accident: There is no evidence of intracranial hemorrhage, ischemia, fractures, or extra-axial fluid collections on the CT scans. However, in these 2 images from just above the level of the skull base, the left internal
carotid artery (seen on the right side of the image) has an enlarged, heterogeneous appearance (A and B, arrows). This is consistent with intramural hematoma. Because an intramural hematoma suggests a dissection, MRI with magnetic resonance angiography (MRA) is ordered to further investigate the status of the internal carotid artery. An axial source image from the MRA confirms the decreased caliber of the vessel's true lumen (C, arrow). A 3-dimensional maximum intensity projection (MIP) shows decreased flow in the left internal carotid artery (D, arrow). This is confirmed by the 3-dimensional collapsed MIP image (E, arrow). An axial T1-weighted image reveals an intimal flap in the left internal carotid artery (F, arrow); this confirms the diagnosis of a dissection of that vessel. None of the remaining MRI images show evidence of an infarct. Thus, the patient's symptoms are attributable to diminished blood flow to the left cerebral hemisphere secondary to a dissection of the left internal carotid artery. **Outcome of this case.** Anticoagulation was initiated, and at 3-month follow-up, the patient's symptoms were resolving.

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