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A 44-Year-Old Man With Abdominal Pain, Lung Nodules, and Hemoperitoneum

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A 44-year-old man presented with a 1-day history of sudden-onset abdominal pain. The pain was characterized as severe, diffuse, sharp, and nonradiating. Associated symptoms included nausea, vomiting, diarrhea, and subjective fevers. He was originally from El Salvador, but had not traveled in > 10 years. Review of systems was positive for 2 weeks of dry cough with associated mild, bilateral, pleuritic chest pain and subjective weight loss. His medical history was notable for gout and end-stage renal disease secondary to chronic nonsteroidal antiinflammatory drug use, for which he attended hemodialysis sessions three times weekly. Surgical history consisted of a currently nonfunctioning left upper extremity fistula, a longstanding right internal jugular PermCath IV access for chronic hemodialysis that had been removed 2 weeks prior to presentation, and a left brachiocephalic fistula. He did not smoke, consume alcohol, or have a history of illicit drug use.

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Physical Examination Findings

The patient was a well-nourished man in mild distress secondary to abdominal pain. Vital signs were as follows: temperature, 37.3°C; heart rate, 108 beats/min; BP, 177/92 mm Hg; respiratory rate, 24 breaths/min; and oxygen saturation, 97% while on 2 L/min of oxygen via nasal cannula. Significant physical examination findings included fine bibasilar crackles in the chest, abdomen diffusely tender to palpation, regular heart sounds without murmurs or gallops, and no lymphadenopathy or skin rashes.

Diagnostic Studies

Transthoracic echocardiogram showed an echodensity on the anterior leaflet of the mitral valve. Contrast-enhanced CT scan of the abdomen showed an ovoid focus of contrast arising from an arcuate branch of the superior mesenteric artery (Fig 1). Chest CT scan was notable for multiple cavitory nodular opacities of varying sizes (Figs 2A, 2B).

Figure 1 – Contrast-enhanced CT scan of the abdomen: arrow shows an ovoid focus of contrast arising from an arcuate branch of the superior mesenteric artery.

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Figure 2 – A, B, High-resolution chest CT scan (A) demonstrating multiple bilateral variable-sized pulmonary nodules and (B) showing peripheral nodules with central cavitation and bilateral small pleural effusions.

What is the diagnosis?

Diagnosis: Mycotic pseudoaneurysm of the superior mesenteric artery, septic pulmonary emboli, and mitral valve infective endocarditis secondary to an intravascular catheter-related infection

Discussion

The prevalence of visceral artery aneurysms (VAAs) on routine autopsies is 0.01% to 0.2%. The most common arteries involved are the splenic and hepatic arteries, with a 60% and 20% prevalence, respectively. VAAs are classified as either true aneurysms or pseudoaneurysms. True aneurysms involve progressive dilation and wall thinning of all three layers of the arterial wall. Pseudoaneurysms involve a tear of the vessel wall with subsequent formation of a periarterial hematoma. Causes of VAAs include arteriosclerosis, congenital syndromes, fibromuscular disorders, collagen disorders, trauma, inflammation, infection, and vasculitis.

Superior mesenteric artery aneurysms (SMAAs) comprise 5.5% of all VAAs, making them the third most common after splenic and hepatic artery aneurysms. Multiple autopsy studies show an SMAA prevalence of one in 12,000 to one in 19,000 cases. In fact, since DeBakey and Cooley performed the first successful surgical repair of an SMAA in 1953, < 200 cases of SMAA have been reported. SMAAs most commonly occur in the proximal 5 cm of the artery. They have an average diameter of 2.2 cm. There is an equal prevalence between sexes.

When determining the likelihood of an infectious cause, patient age and the vessel involved are important factors to consider. Most VAAs are mycotic in patients aged < 50 years and noninfectious in patients aged > 60 years. Aortic aneurysms represent the most common site of mycotic aneurysms, followed in frequency by SMAAs, of which 60% are infectious in cause. Mycotic aneurysms are either a direct expansion from a contiguous infective focus (primary) or the result of a septic embolization that lodges in the vasa vasorum (secondary). Secondary mycotic aneurysms are often a consequence of infective endocarditis. A septic embolus lodges in the adventitial vasa vasorum causing a local arteritis that extends into the medial arterial layer and promotes degradative remodeling. Gram-positive bacteria (most commonly *Staphylococcus aureus* followed by *Streptococcus* species) and gram-negative bacilli are the organisms most commonly identified as the causes of mycotic SMAAs. *Aspergillus* and *Candida* are the most commonly

isolated fungal causative organisms. However, in 25% of cases, no pathologic organism is ever identified.

Considering SMAAs of any cause, 70% to 90% are symptomatic on presentation; 38% to 50% present with rupture and impending hemorrhagic shock. Rupture is more likely to occur in men and in patients whose aneurysms are noncalcified. Other presenting symptoms include diffuse abdominal pain, cramping reminiscent of intestinal ischemia, a tender and pulsatile abdominal mass (identified in up to 50% of patients), fever, nausea, and vomiting. Complications of SMAAs other than rupture include thrombosis followed by distal embolization of infected clot particles, leading to intestinal ischemia. SMAAs also sometimes erode into adjacent bowel, causing GI bleeding.

The best imaging modalities for identifying SMAAs are contrast CT scan and MRI, both of which have a sensitivity and specificity of 90% to 95%. Contrast CT scanning shows a pseudoaneurysm as an enhanced mass of soft tissue attenuation adjacent to a vessel. CT angiography is helpful prior to surgical intervention to evaluate for evidence of aneurysm rupture and for the presence of collateral flow around the aneurysm. Ultrasonography has a lower sensitivity of 82% and specificity of 92% and shows a pseudoaneurysm as a swirling pattern of internal flow in the center of the mass.

Surgery is the recommended treatment of SMAAs. Because of the high risk of SMAA rupture, surgery should be performed as soon as possible after diagnosis regardless of the size of the aneurysm or the presence of symptoms. Surgery of choice is aneurysm resection with arterial reconstruction to prevent ischemia; alternatively, segmental resection of the involved bowel can be performed. Resection and reconstruction is accomplished via autologous vein grafting, with the saphenous vein being the conduit of choice in mycotic aneurysms or in cases with intestinal ischemia. Ligation of the vessel without reconstruction is possible if the patient has adequate collateral flow to the intestine via inferior pancreaticoduodenal or middle colic artery branches. Embolization and stenting confer a greater risk of mesenteric ischemia and are therefore reserved for poor surgical candidates or hemodynamically unstable patients.

Clinical Course

The patient underwent CT mesenteric angiography, which substantiated the presence of a 19 × 14-mm pseudoaneurysm of the superior mesenteric artery, essentially stable as compared with the findings of previous CT scans. All four blood cultures were positive for pansensitive

Enterococcus. Transesophageal echocardiogram revealed a 1-mm-diameter mitral valve vegetation. The patient had already been started on empirical antibiotic therapy, which was tailored to the culture results. Given the patient's positive bacteremia and evidence of infective endocarditis, his SMAA was determined to be mycotic in origin. The pulmonary nodules represented septic emboli; the source was most likely an infected PermCath, which had been removed surgically 2 weeks prior to presentation. The SMAA was not operated on immediately because it was stable on serial CT scans and the patient was clinically stable. On hospital day 5, the patient developed acute-onset worsening headache, right upper-extremity weakness, and vision changes. Head CT scan revealed a large right occipital lobe hematoma with midline shift, secondary to ruptured mycotic aneurysm of the right posterior cerebral artery. Despite all measures, the patient ultimately succumbed to complications related to this event.

Clinical Pearls

1. SMAA is an important differential diagnosis in any patient who presents with abdominal pain, fever, and a pulsatile mass.
2. CT scan with contrast and MRI are the most sensitive and specific imaging modalities for diagnosing SMAAs, but ultrasonography can also be helpful.
3. Surgery is the treatment of choice for SMAAs because of their high risk of rupture and patient death; 6 to 8 weeks of antibiotic therapy is also indicated in the case of mycotic aneurysms.
4. Mycotic VAAs are a rare but important cause of mortality in infective endocarditis.

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Suggested Readings

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