

RADIOLOGY ROUNDS

MARTIN QUAN, MD

Department Editor

A woman with severe epigastric pain and elevated amylase levels

James D. Collins, MD

This 63-year-old woman, an achondroplastic dwarf with several congenital anomalies and many medical problems, was admitted to the university medical center with acute severe midepigastric pain that woke her up that morning. She had nausea but no vomiting and persistent pain radiating into the back. Later that morning, she passed a single normal bowel movement but no rectal gas since then.

She had a similar episode 3 months earlier with elevated serum amylase levels that was diagnosed as pancreatitis and relieved by nasogastric suction. Her medical history included a left nephrectomy for nephrocalcinosis and medullary cystic disease and known right nephrocalcinosis and aortic insufficiency.

The diagnostic workup

Findings of the physical examination of this woman in moderate distress included the following: blood pressure, 106/62 mm Hg and stable; temperature, normal; heart, a grade 4/6 diastolic decrescendo murmur at base; abdomen, distended and tender to deep palpation in the epigastric region without rebound or guarding; bowel sounds, hypoactive; and no organomegaly or masses. Laboratory results included a white blood cell (WBC) count of 9,300/ μ L and serum amylase levels of 110 U/L (N, 25-125). Both pancreatitis and bowel infarction or obstruction can cause hyperamylasemia.

An anteroposterior (AP) kidney-ureters-bladder (KUB) radiograph on this patient (Figure 1) displays left concave thoracolumbar scoliosis and a small right renal density with calcifications (computerized magnification or lateral or oblique views would be necessary to localize calcifications). Margins of the psoas muscle are not well visualized. A single large loop of

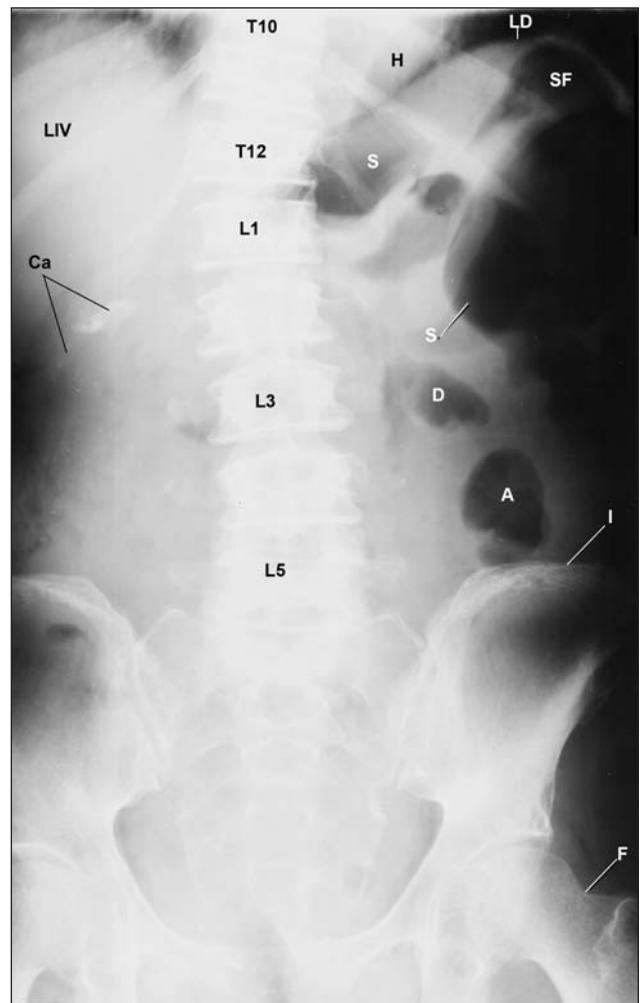


Figure 1 In this anteroposterior radiograph of the abdomen, ascites obscures the psoas margins (fatty envelope) and the duodenum (D), which is displaced to the left of midline. The dilated descending colon (SF) displaces the stomach (S) into the left upper hypochondrium. A calcified density (Ca) is present over the region of the left kidney and to the right of midabdomen, below the liver (LIV). Observe the mild left concave scoliosis of the thoracolumbar spine (T10-L5). A = antrum of stomach; F = femur; H = heart; I = iliac bone; LD = left hemidiaphragm, L1-5 = lumbar vertebrae; T10-T12 = thoracic vertebrae.

Dr. Collins is professor, department of radiology, David Geffen School of Medicine at UCLA. Dr. Quan is professor of family medicine, department of family medicine, David Geffen School of Medicine at UCLA. He is also editor in chief of *Family Practice Recertification*.

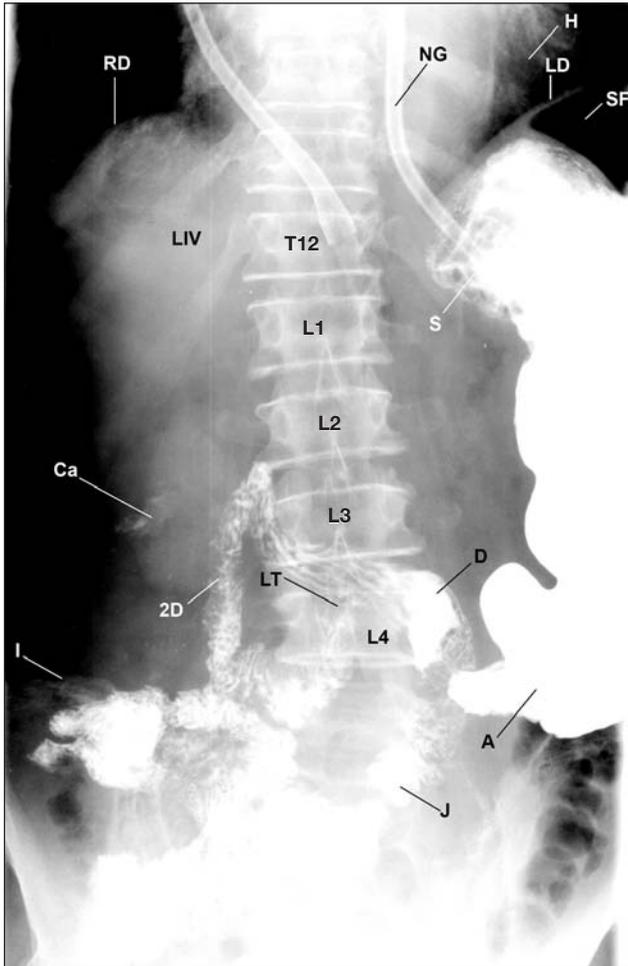


Figure 2 This is an anteroposterior radiograph of the abdomen after an upper gastrointestinal series. The barium was introduced under fluoroscopic control through a nasogastric tube (NG), with its tip directed into the stomach (S). Observe the left lateral displacement of the barium-filled duodenum (D) and antrum (A) of the stomach, the inferior displacement of the ligament of Treitz (LT), the jejunum (J), and the calcifications (Ca) compared with Figure 1 (page 16). 2D = second (descending) part of the duodenum; H = heart; I = iliac bone; LIV = liver; LD and RD = left and right hemidiaphragm; T12 = thoracic vertebra; L1-L4 = lumbar vertebrae, SF = splenic flexure.

distended bowel is present in the left upper quadrant, but no rectal air. The remaining bowel gas pattern is otherwise unremarkable.

In an AP abdominal radiograph after an upper gastrointestinal series was performed, the stomach and duodenal loop are not in their normal positions (Figure 2). The entire jejunum below the ligament of Treitz

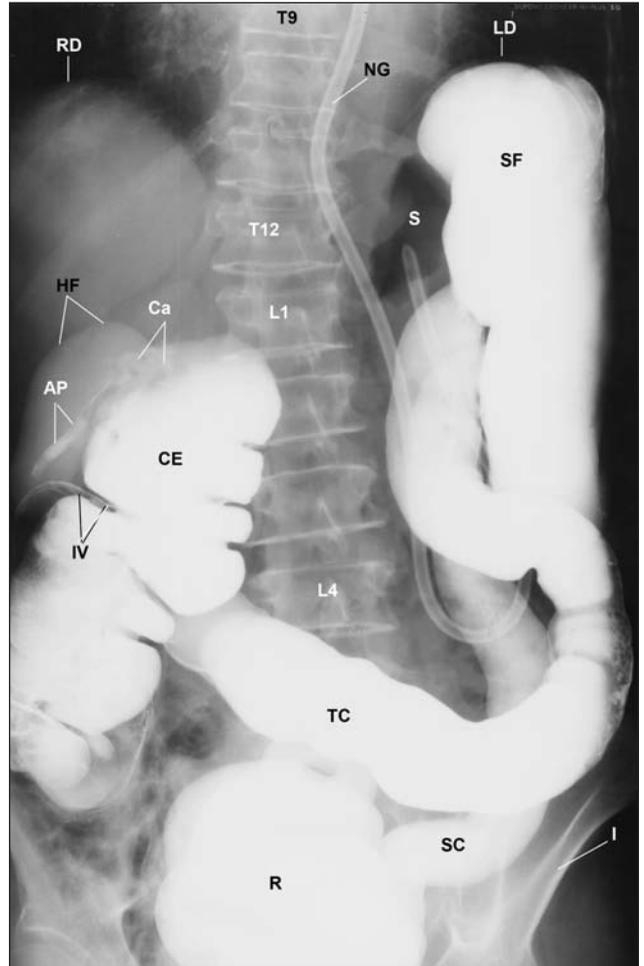


Figure 3 This is an anteroposterior radiograph of the abdomen after a barium enema. The images display the dilated splenic flexure (SF) of the colon, counter-clockwise rotation of the cecum (CE) into the left upper quadrant, the ileocecal valve (IV) lateral instead of medial to the cecum, and the left concave scoliosis of the thoracolumbar spine (T9-L4). The barium-filled appendix (AP) overlays the hazy density of the hepatic flexure of the colon. Ca = calcifications; HF = hepatic flexure of the colon; I = iliac bone; LD and RD = left and right hemidiaphragm; NG = nasogastric tube; R = rectum; S = stomach; SC = sigmoid colon; TC = transverse colon.

is displaced into the lower midabdomen.

In an AP radiograph of the abdomen after a barium enema (Figure 3), the cecum and appendix are rotated counterclockwise into the right upper quadrant, and the ileocecal valve is displaced laterally, consistent with partial malrotation of the bowel, a congenital anomaly.

continued

The hospital course

The working diagnosis when this patient was admitted was recurrent pancreatitis. During the next 24 hours, the pain became constant and more severe, affecting the right upper quadrant more than the left. The abdominal distention increased, but she passed no gas. She had a single hypotensive episode, and urine output declined. Findings of the abdominal examination changed to definite guarding, with diffuse rebound tenderness. Bowel sounds disappeared. Laboratory results were WBC count, 16,500/ μ L, and amylase level, 290 U/L. Her blood pressure was 150/80 mm Hg and pulse, 92 beats per minute; she had a throbbing headache that radiated over the back of the neck into both eyes, all reflecting impedence of venous return.

An emergency laparotomy was performed with a preoperative diagnosis of small bowel obstruction. At surgery, a large amount (1,200 μ L) of free fluid was found; the entire right colon was blackened and necrotic; and there was no mesentery. The cecum was extremely mobile and had twisted about its vascular axis to form a complete volvulus with vascular obstruction and gangrene. The distance from the ileocecal valve to the midtransverse colon was about 45 cm. The pancreas, gall bladder, common bile duct, and pelvic organs were normal. The left kidney was absent, and the right kidney was noncystic and of normal size.

The patient survived this episode with a final diagnosis of volvulus of a congenitally malrotated right colon and was lost to follow-up.

Discussion

Portions of the large bowel most frequently involved with volvulus are the cecum and the sigmoid. Predisposing factors are a long mesentery and congenital malrotation of the bowel. As in this case, cecal volvulus may occur when the cecum is not fixed to the abdominal wall (a mobile cecum). It may be pointed toward the midabdomen or found in the right iliac fossa.

Volvulus is actually torsion of the cecum, because the twist occurs above the ileocecal valve. The dilated, gas-filled loop almost always appears in the left upper quadrant but has been found in all quadrants. It occasionally appears as the classic kidney-shaped loop with the mesentery at the hilum. The disorder most often occurs in the 20-40 year old age-group, affecting men more than women. If a barium enema is performed, the contrast stops at the stenosis and the tapered end

points to the torsion. The volvulus will occasionally impinge on the third portion of the duodenum as it rotates on the axis of the superior mesenteric artery and cause symptoms of small bowel obstruction.

Obstruction to venous return occurred in this patient, twisting the cecum and causing vascular occlusion and necrosis of the right colon. Any decrease in venous return increases intra-abdominal, intrathoracic, and intracranial pressure.

Take-home message

The history of distended abdomen, hypoactive bowel sounds, and increased white blood cell count and amylase levels is important because of the similar episode 3 months earlier with a misleading diagnosis of pancreatitis. Plain abdominal radiographs may suggest the diagnosis of cecal volvulus when the cecum rotates on its long axis and the small bowel is obstructed, and a dilated loop of bowel supports mechanical obstruction. The displaced small intestine and proximal colon suggest mesenteric vascular occlusion and possible pancreatitis, but the radiographs rule out the latter. ■

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