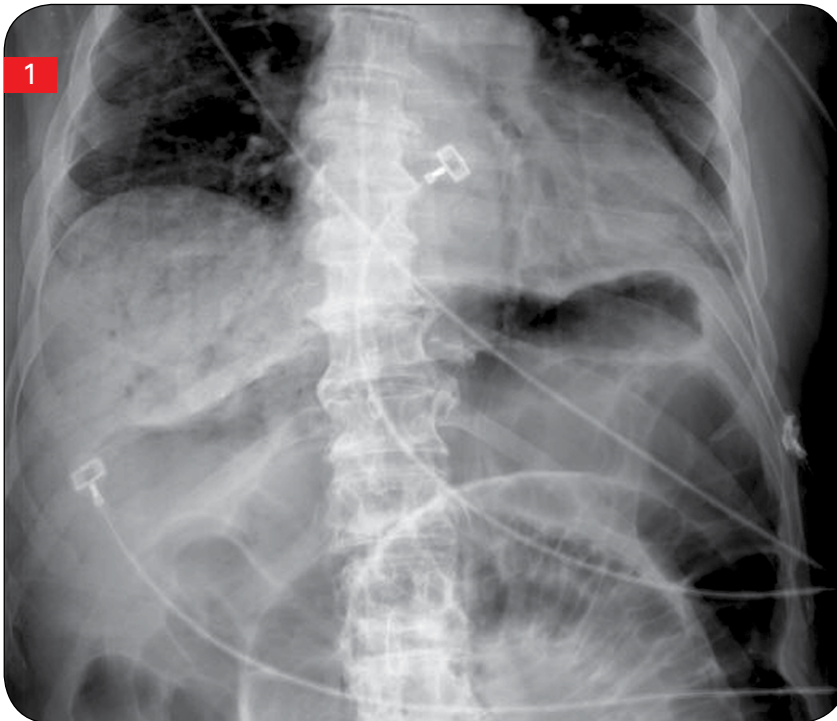


## PROBLEM

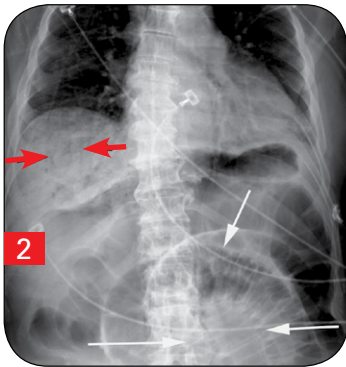


>> A 70-year-old man presents to the ED with acute onset of severe abdominal pain. A radiograph is obtained (Figure 1).

**What is your diagnosis?**

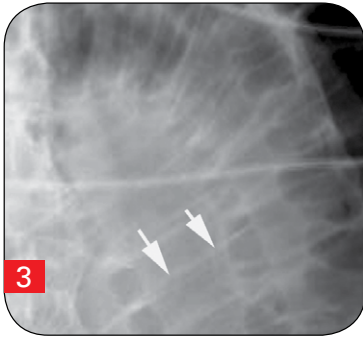
*Turn page for answer >>*

## ANSWER



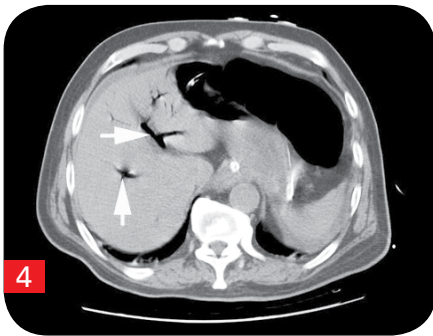
>> The radiograph demonstrates multiple dilated loops of small bowel in the mid abdomen (white arrows, Figure 2). These loops can be definitively identified as small bowel (as opposed to large bowel) by their central location and the presence of the valvulae conniventes, or folds in the small bowel that extend across the entire width of the bowel loop (white arrows, Figure 3). Folds in large bowel (haustra) do not extend across the entire width of the bowel. A loop of small bowel measuring greater than 3.0 cm is dilated, and in such cases a small bowel obstruction should be considered.

However, the evaluation of an abdominal radiograph should not end with the identification of a small bowel obstruction. On an upright film, close inspection beneath the hemidiaphragms is warranted to look for free air, which, if present, indicates bowel perforation. The right upper quadrant should also be evaluated to exclude portal venous gas. Air in the portal venous system presents radiographically as branching linear lucencies overlying the liver. Such lucencies are seen on our patient's radiograph (red arrows, Figure 2).

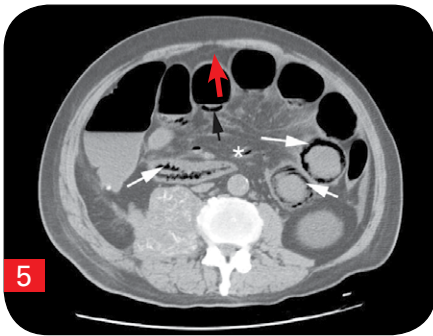


It is important to evaluate for portal venous gas, as the presence of such is predictive of poor outcomes, with mortality rates as high as 75% to 90% in patients with this finding on abdominal radiographs.<sup>1</sup> Air in the portal venous system, especially in the setting of bowel obstruction, is typically due to ischemia and transmural infarction of the bowel. Although radiographs are useful in the detection of portal venous gas, CT has been

shown to be more sensitive. In a review of CT findings, 91% of patients with both portal venous gas and pneumatosis intestinalis (air in the bowel wall) had a transmural infarction of the bowel wall.<sup>2</sup>



The CT examination of our patient demonstrates both portal venous gas (white arrows, Figure 4) and pneumatosis intestinalis (white arrows, Figure 5). Pneumatosis can be distinguished from air that is trapped under bowel contents (red arrow, Figure 5) because the air density in the former is seen in nondependent portions of the wall. In this case, air can also be identified within the veins of the mesentery (white asterisk, Figure 5). The patient was taken emergently to surgery, and the presence of a long segment of ischemic small bowel was confirmed.



Although the finding of portal venous gas is strongly associated with bowel ischemia, the differential diagnosis also includes infection, inflammatory disease, trauma, and iatrogenic causes such as recent interventional radiology procedures or transplantation.

### REFERENCES

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2. Wiesner W, Mortelé KJ, Glickman JN, et al. Pneumatosis intestinalis and portomesenteric venous gas in intestinal ischemia: correlation of CT findings with severity of ischemia and clinical outcome. *AJR Am J Roentgenol*. 2001;177(6):1319-1323.

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