

Perry J. Pickhardt, MD²

The Colon Cutoff Sign¹

APPEARANCE

The colon cutoff sign describes the abrupt termination of gas within the proximal colon at the level of the radiographic splenic flexure, usually with decompression of the distal colon (Fig 1). The sign was originally applied to conventional abdominal radiographs, but similar findings can be seen on computed tomographic (CT) (Fig 2) and intraluminal contrast material enema (Fig 3) studies.

EXPLANATION

Inflammatory exudate in acute pancreatitis that extends into the phrenicocolic ligament by directly spreading through the lateral attachment of the transverse mesocolon gives rise to this sign.

Infiltration of the phrenicocolic ligament results in functional spasm and/or mechanical narrowing of the splenic flexure at the level where the colon returns to the retroperitoneum.

This transition point, or cutoff, is further accentuated by distention of the intraperitoneal transverse colon from the focal adynamic ileus, which is also a result of the underlying inflammatory process. This appearance can mimic a true colonic obstruction.

DISCUSSION

A bowel gas pattern that simulates colonic obstruction at the splenic flexure in the setting of pancreatitis has been recog-

nized for more than 50 years (1-3). The observed sensitivity of the colon cutoff sign in acute pancreatitis will depend on several factors, including threshold criteria for a positive cutoff sign and severity of pancreatic disease in the study population. Findings in one study indicated the presence of colon cutoff at the splenic flexure in 28 of 54 patients (52%) with acute pancreatitis (3), while findings in other series have indicated rates of occurrence as low as 2% (4,5). Although various explanations to account for the colonic gas pattern have been offered in the past, the role of inflammatory spread along the phrenicocolic ligament is now generally accepted, largely because of the work of Meyers and colleagues (6,7).

The phrenicocolic ligament is a fold of peritoneum that extends from the splenic flexure to the posterolateral aspect of the left hemidiaphragm to form a shelf on which rests the spleen (8). This ligament marks the site where the colon exits the peritoneal cavity and represents an important crossroads of abdominal anatomy and, consequently, for spread of abdominal disease.

The phrenicocolic ligament is continuous with the medial aspect of the transverse mesocolon and also shares direct or indirect communication with the gastrosplenic, gastrocolic, and splenorenal ligaments (6). These ligamentous interconnections explain how such disparate entities as pancreatic and gastric carcinoma, splenic artery hemorrhage, abdominal aortic aneurysm rupture, and postpancreatitis stricture can all result in focal colonic narrowing at the splenic flexure (6,9-11).

Colon-centered disease at the splenic flexure, including both neoplastic and inflammatory conditions, can also produce a similar appearance. Therefore, although pancreatitis is most commonly associated with the colon cutoff sign, it is a nonspecific finding and should warrant further investigation with cross-sectional imaging.

In addition to the colon cutoff sign, many other abdominal radiographic findings in the setting of acute pancreatitis have been enumerated, with varying degrees of utility (12). The majority of these findings reflect abnormal yet nonspecific changes in the bowel gas pattern. The sentinel loop, which refers to focal adynamic ileus of an isolated small-bowel segment, is perhaps the best known of these signs and is seen in up to one-half of cases (13). Other reported changes in the abdominal gas pattern range from a paucity of bowel gas to generalized ileus. Pancreatic calcifications, radiopaque gallstones, and left-sided pleural effusion can be helpful findings. Relatively specific but insensitive radiographic signs include pancreatic enlargement, peripancreatic mottling from fat necrosis, and pancreatic gas (14,15).

The contribution of the radiologist to the evaluation of acute

Index terms:

Colon
Colon, CT, 754.1211
Pancreatitis, 77.291
Signs in Imaging

Radiology 2000; 215:387-389

¹ From the Mallinckrodt Institute of Radiology, Washington University School of Medicine, St Louis, Mo. Received September 18, 1998; revision requested November 10; revision received November 30; accepted March 16, 1999. Address correspondence to the author, PSC 1005, Box 36, FPO AE 09593 (e-mail: pjpickhardt@gan10.med.navy.mil).

Current address:

² U.S. Naval Hospital, Guantanamo Bay, Cuba.

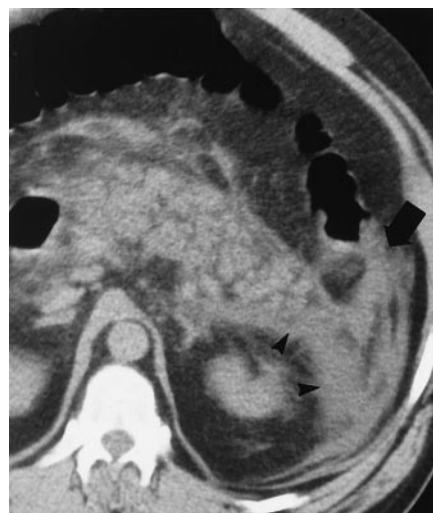
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Figure 1. Frontal abdominal radiograph in a 24-year-old woman with acute pancreatitis shows termination of colonic gas at the splenic flexure (arrow).



a.



b.

Figure 2. Colon cutoff sign in a 42-year-old man with acute pancreatitis. (a) Frontal scout topogram for abdominal CT shows abrupt cut-off of colonic gas column at the splenic flexure (arrow). The colon is decompressed beyond this point. (b) Nonenhanced transverse CT image shows findings of pancreatitis with direct extension of the inflammatory process into the phrenicocolic ligament (arrow), which results in narrowing at the splenic flexure. Note also the extension of exudate into the anterior pararenal space (arrowheads).

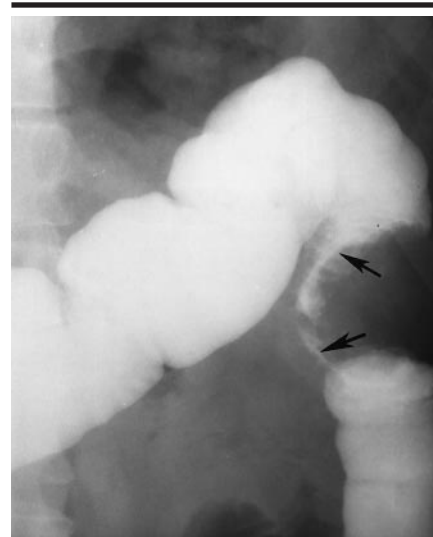


Figure 3. Frontal radiograph from solid-column barium enema examination in a 37-year-old man with pancreatitis shows marked, eccentric luminal narrowing and mucosal irregularity at the splenic flexure (arrows) where the colon returns to the retroperitoneum. Although the appearance suggests malignancy, only benign inflammation extending into the phrenicocolic ligament from the pancreas was found at surgery and histopathologic examination.

pancreatitis has increased dramatically in recent years, mainly because of advances in cross-sectional imaging. CT examination during the initial work-up not only can help confirm the clinical diagnosis and help exclude other entities but also is valuable in staging disease severity and assessing the need for possible intervention (16,17).

CT plays an important role in differentiating edematous and necrotizing forms of acute pancreatitis, since clinical assessment alone can result in underestimation of the severity of disease (18,19). This distinction between mild and severe forms of acute pancreatitis has important therapeutic implications. CT is also valuable for detecting other complications of pancreatitis, such as fluid collections and pseudocysts, abscess, hemorrhage, biliary obstruction, pseudoaneurysm, and venous thrombosis (20).

Despite the utility of CT in evaluating pancreatitis, recognition of the radiographic findings associated with this disease, including the colon cutoff sign, remains important since conventional radiography is often the first imaging modality requested for patients with abdominal complaints.

References

1. Baylin GJ, Weeks KD. Some roentgen aspects of pancreatic necrosis. *Radiology* 1944; 42:466-470.
2. Schwartz S, Nadelhaft J. Simulation of colonic obstruction at the splenic flexure by pancreatitis: roentgen features. *AJR Am J Roentgenol* 1957; 78:607-616.
3. Brascho DJ, Reynolds TN, Tanca P. The radiographic "colon cut-off sign" in acute pancreatitis. *Radiology* 1962; 79:763-768.
4. Weens S, Walker LA. The radiological diagnosis of acute cholecystitis and pancreatitis. *Radiol Clin North Am* 1964; 2:89-106.

5. Cantwell DF, Pollock AV. Radiology of acute pancreatitis. *J Fac Radiol* 1959; 10:95-99.
6. Meyers MA. Roentgen significance of the phrenicocolic ligament. *Radiology* 1970; 95:539-545.
7. Meyers MA, Evans JA. Effects of pancreatitis on the small bowel and colon: spread along mesenteric planes. *AJR Am J Roentgenol* 1973; 199:151-165.
8. Woodburne RT, Burkel WE. The abdomen. In: *Essentials of human anatomy*. 8th ed. New York, NY: Oxford University Press, 1988; 430.
9. Oliphant M, Berne AS, Meyers MA. The subperitoneal space of the abdomen and pelvis: planes of continuity. *AJR Am J Roentgenol* 1996; 167:1433-1439.
10. Politoske EJ. Ruptured abdominal aortic aneurysm presenting as an obstruction of the left colon. *Am J Gastroenterol* 1990; 86:745-747.
11. Mohiuddin S, Sakiyalak P, Gullick HD, et al. Stenosing lesions of the colon secondary to pancreatitis. *Arch Surg* 1971; 102:229-231.
12. Davis S, Parbhoo SP, Gibson MJ. The plain abdominal radiograph in acute pancreatitis. *Clin Radiol* 1980; 31:87-93.
13. Stein GN, Kalser MH, Sarian NM, et al. An evaluation of roentgen signs in acute pancreatitis, correlation with clinical findings. *Gastroenterology* 1959; 36:356-361.
14. Balthazar EJ, Lutzker S. Radiological signs of acute pancreatitis. *Crit Rev Clin Radiol Nucl Med* 1976; 4:199-242.
15. Baker SR. Plain film radiology of the pancreas and adrenal glands. In: Baker SR, ed. *The abdominal plain film*. East Norwalk, Conn: Appleton & Lange, 1990; 299-326.
16. Clavien PA, Hause H, Meyer P, et al. Value of contrast enhanced computerized tomography in the early diagnosis and prognosis of acute pancreatitis: a prospective study of 202 patients. *Am J Surg* 1988; 155:457-466.
17. Balthazar EJ, Robinson DL, Megibow JA, Ranson JHC. Acute pancreatitis: value of CT in establishing prognosis. *Radiology* 1990; 174:331-336.
18. Tran DD, Cuesta MA. Evaluation of severity in patients with acute pancreatitis. *Am J Gastroenterol* 1992; 87:604-608.
19. Peterson LM, Brooks JR. Lethal pancreatitis: a diagnostic dilemma. *Am J Surg* 1979; 137:491-496.
20. Balthazar EJ. CT diagnosis and staging of acute pancreatitis. *Radiol Clin North Am* 1989; 27:19-37.