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## Diffuse abdominal pain, vomiting

The patient had undergone a cholecystectomy years earlier following an episode of gallstone pancreatitis. So what was causing the pain this time around?

**CASE** ▶ A 57-year-old Caucasian woman sought care at our emergency department (ED) for diffuse abdominal pain and nausea. She said that the pain began after eating lunch earlier that day, and localized periumbilically, with radiation to the back. She had several episodes of nonbilious, nonbloody vomiting, but denied fever, chills, or diarrhea.

Her past medical history was notable only for an episode of gallstone pancreatitis 11 years earlier, after which she underwent a cholecystectomy. Her only medications were ibandronate sodium (Boniva) taken for osteoporosis (diagnosed 2 years earlier), a multivitamin, calcium, magnesium, and vitamin E supplements. Her family history was notable for a brother who had pancreatic cancer in his 50s. The pa-

tient reported infrequent alcohol use.

The abdominal exam was notable for diffuse tenderness to palpation, most prominent in the epigastric region. The patient exhibited voluntary guarding, without rebound, and positive bowel sounds throughout.

The patient's laboratory studies on admission included leukocytosis of 21,300 cells/mL and hemoglobin and hematocrit of 17.3 g/dL and 52.1%, respectively. She had an amylase of 1733 U/L and lipase of 4288 U/L. Lactate and lactic dehydrogenase were 1.83 mg/dL and 265 U/L, respectively. Liver function tests and a basic metabolic panel were within normal limits. A noncontrast computed tomography (CT) scan of the abdomen and pelvis was notable for an enlarged pancreas with peripancreatic edema and free fluid in the abdomen.

The patient underwent aggressive fluid resuscitation throughout the first 6 hours of her hospital stay. Urine output was noted to be incongruent with fluid intake, at just over 60 cc/h. Over the next 4 hours, she became progressively tachycardic, tachypneic, and somnolent, with increasing abdominal tenderness. Her serum potassium level rose to 4.9 mEq/L, while serum bicarbonate declined to 13 mEq/L and serum calcium, to 6.2 mg/dL. Arterial blood gas revealed metabolic acidosis with a pH of 7.22.

Our patient was subsequently transferred to the medical intensive care unit, where she required endotracheal intubation.

**○ WHAT IS THE MOST LIKELY EXPLANATION FOR HER CONDITION?**

**FIGURE**  
**CT scan of abdomen**  
**taken on second day of admission**

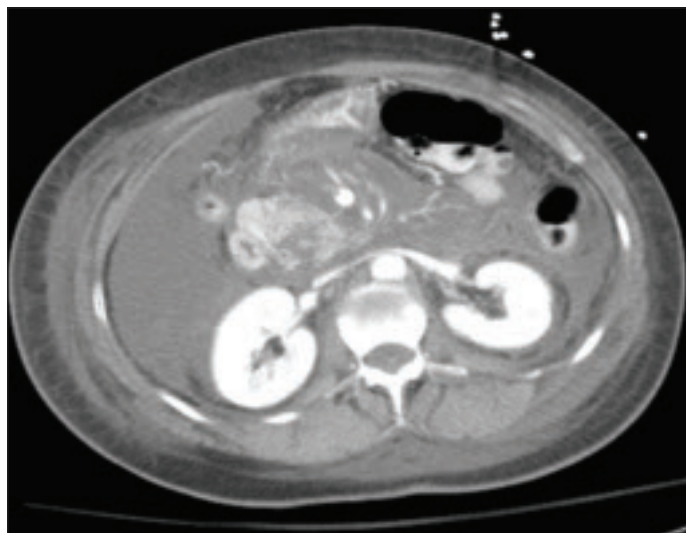


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### Acute necrotizing pancreatitis

A repeat CT scan of the abdomen and pelvis with IV contrast taken on the second day of admission revealed extensive pancreatitis with complete disintegration of the pancreatic tissue and absence of pancreatic enhancement (FIGURE), as well as a large amount of abdominal ascites.

Pancreatitis is a common inpatient diagnosis, with approximately 200,000 hospitalizations yearly.<sup>1</sup> Most cases are mild and self-limiting, requiring minimal intervention including parenteral fluid resuscitation, pain control, and restriction of oral intake. Most cases can be attributed to gallstones or excessive alcohol use, but approximately 25% of cases are idiopathic.<sup>1</sup> Other causes include hypertriglyceridemia, infection, hypercalcemia, and medications such as azathioprine, 6-mercaptopurine, trimethoprim sulfamethoxazole, and furosemide. Severe necrotizing pancreatitis represents about 20% of all cases, but carries a mortality rate of between 10% and 30%.<sup>1</sup>

**■ Diagnosis is based on clinical features** in conjunction with biochemical markers. Amylase is nonspecific, but levels 3 times the upper limit of normal are usually diagnostic of acute pancreatitis. Lipase is 85% to 100% sensitive for pancreatitis, and is more specific than amylase. Alanine aminotransferase >150 IU/L is 96% specific for gallstone pancreatitis.<sup>2</sup> Of note: there is no evidence to support daily monitoring of these enzyme levels as predictors of clinical improvement or disease severity.

### Predicting severity at time of presentation can be difficult

As was true with our patient, predicting the severity of acute pancreatitis at the time of presentation can be difficult. Scoring systems that are commonly used to evaluate disease severity include Ranson's score, APACHE-II (Acute Physiology and Chronic Health Evaluation-II), and CT severity index, among others (TABLE). Of these, the APACHE-II score has been found to be most predictive of progression to severe disease, with accuracy of up to 75%.<sup>3</sup>

Recent studies have shown that a body

mass index >30 kg/m<sup>2</sup> is an independent risk factor for progression to severe pancreatitis.<sup>4</sup> Other clinical predictors include poor urine output, rising hematocrit, agitation or confusion, and lack of improvement in symptoms within 48 hours.<sup>1</sup>

**■ Though our patient came in with symptoms** that were initially mild, she quickly manifested several clinical predictors for severe pancreatitis, including poor urine output and increasing confusion, as well as an APACHE-II score of 12 at 6 hours after presentation (values ≥8 indicate high risk for progression to severe disease).

### Role of antibiotics? A source of debate

Infection represents the leading cause of morbidity and mortality in patients with pancreatic necrosis. Approximately 40% of patients with necrosis develop infection, with a 20% mortality rate.<sup>5</sup> Signs of infection usually develop relatively late in the clinical course and rates increase drastically each week a patient remains hospitalized (71% of patients have signs of infection at 3 weeks).<sup>5</sup>

Interestingly, the role for antibiotics in such patients has been a source of debate in practice, as well as in the medical literature. Two recent large meta-analyses came to different conclusions regarding the use of antibiotics. A 2006 study by Heinrich et al concluded that patients with pancreatic necrosis demonstrated by contrast-enhanced CT scans should receive antibiotic prophylaxis with imipenem or meropenem for 14 days, and that prophylactic antibiotics do not increase rates of subsequent fungal infection.<sup>6</sup> Conversely, as noted in a 2008 study published in the *American Journal of Gastroenterology*, "prophylactic antibiotics cannot reduce infected pancreatic necrosis and mortality in patients with acute necrotizing pancreatitis."<sup>7</sup>

Two leading professional groups have similarly contradictory recommendations on the topic, with the American Gastroenterological Association (AGA) supporting antibiotic use for patients with >30% pancreatic necrosis noted on CT and the American College of Gastroenterology (ACG)

**>** Clearly, in the most high-risk patients, it would be difficult to justify withholding antibiotics.

**TABLE**

## Predictors for progression to severe pancreatitis<sup>1</sup>

Ranson score $\geq 3$
APACHE-II score $\geq 8$
CT severity index (CT grade + necrosis score) $>6$
Body mass index $>30$ kg/m <sup>2</sup>
Hematocrit $>44\%$ (clearly increases risk for pancreatic necrosis)
Clinical findings: <ul style="list-style-type: none"> <li>• Thirst</li> <li>• Poor urine output</li> <li>• Progressive tachycardia or tachypnea</li> <li>• Hypoxemia</li> <li>• Agitation/confusion</li> </ul>
Lack of improvement in symptoms within the first 48 hours

APACHE, Acute Physiology and Chronic Health Evaluation; CT, computed tomography.

**>**  
The use of early nasojejunal enteral feeding has been advocated by several large meta-analyses, as well as by the AGA and ACG.

recommending against the use of prophylactic antibiotics.<sup>8</sup>

As with any clinical dilemma, it seems prudent to make the decision for or against prophylactic antibiotics based on available clinical information and the particular patient's risk factors. Clearly, in the most high-risk patients, it would be difficult to justify withholding antibiotic therapy.

### Complete bowel rest—or not?

In the past, it was thought necessary to allow for complete bowel rest and suppression of pancreatic exocrine secretion during acute pancreatitis by providing total parenteral nutrition.<sup>6,9</sup> More recently, though, the use of early nasojejunal enteral feeding (which was initiated for our patient) has been advocated by several large meta-analyses,<sup>8</sup> as well as by the AGA and ACG.<sup>2</sup>

The use of enteral feeding has been associated with improved outcomes, including lower infection rates (due to maintenance of the intestinal barrier and prevention of bacterial translocation), decreased length of stay, reduced rates of organ failure, and fewer deaths among patients who require surgical intervention.<sup>6</sup>

### A lengthy road to recovery for our patient

After 7 days of mechanical ventilation, our patient was extubated. However, she developed significant bilateral pleural effusions as a result of fluid third spacing, and required thoracentesis.

She completed a 14-day course of imipenem, followed by an additional 10-day course due to hypotension and a suspected infected pseudocyst. Subsequent imaging studies confirmed our suspicions: She had developed a large pseudocyst ( $>13$  cm), which remained under observation by both a gastroenterologist and general surgeon. Six weeks after admission, our patient was discharged to home with family.

**■ But what was the cause?** Although we were unable to clearly delineate an inciting cause for her pancreatitis during the admission, she was to undergo further investigation as an outpatient. There were also plans to drain the pseudocyst 6 weeks after discharge.

**■ A learning opportunity.** This patient's case provided an excellent opportunity for our team to review the important clinical predictors for progression to severe pancreatitis, and the rapid nature of clinical decline in

such patients. In hindsight, the predictors of severity in our patient were few, but included the rapid onset and clinical progression of her

symptoms, as well as her elevated hematocrit on presentation and poor urine output over the first 6 hours of admission. **JFP**

**PRACTICE POINTERS**

- ▶ Use the APACHE-II scoring system early on to help predict the severity of pancreatitis.
- ▶ Consider early enteral nutrition in patients with severe disease; taking this step has been linked to lower infection rates and shorter lengths of stay.
- ▶ Consider patient factors and the risk of severe infection when deciding whether or not to use prophylactic antibiotics in cases of severe necrotizing pancreatitis.

References

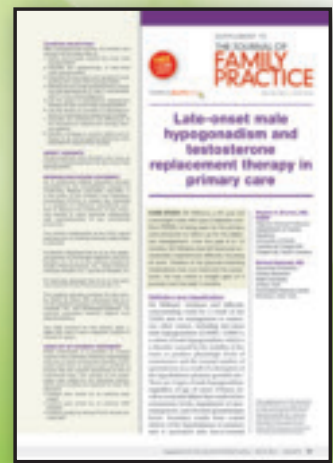
1. Whitcomb DC. Clinical practice. Acute pancreatitis. *N Engl J Med*. 2006;354:2142-2150.
2. Vege SS, Whitcomb DC, Ginsburg CH. Clinical manifestations and diagnosis of acute pancreatitis. In: Basow DS, ed. UpToDate [online database]. Version 18.2. Waltham, Mass: UpToDate; 2010.
3. Vege SS, Whitcomb DC, Ginsburg CH. Predicting severity of acute pancreatitis. In: Basow DS, ed. UpToDate [online database]. Version 18.2. Waltham, Mass: UpToDate; 2010.
4. Skipworth JRA, Pereira SP. Acute pancreatitis. *Curr Opin Crit Care*. 2008;14:172-178.
5. Windsor JA, Schweder P. Complications of acute pancreatitis (including pseudocysts). In: Zinner MJ, Ashley SW, eds. *Main-got's Abdominal Operations*. 11th ed. New York: McGraw-Hill; 2007:chap 37. Available at: <http://www.accesssurgery.com/content.aspx?aid=130125>. Accessed November 30, 2010.
6. Heinrich S, Shafer M, Rousson V, et al. Evidenced-based treatment of acute pancreatitis: a look at established paradigms. *Ann Surg*. 2006;243:154-168.
7. Bai Y, Gao J, Zou DW, et al. Prophylactic antibiotics cannot reduce infected pancreatic necrosis and mortality in acute necrotizing pancreatitis: evidence from a meta-analysis of randomized controlled trials. *Am J Gastroenterol*. 2008;103:104-110.
8. Vege SS, Whitcomb DC, Ginsburg CH. Treatment of acute pancreatitis. In: Basow DS, ed. UpToDate [online database]. Version 18.2. Waltham, Mass: UpToDate; 2010.
9. Haney JC, Pappas TN. Necrotizing pancreatitis: diagnosis and management. *Surg Clin North Am*. 2007;87:1431-1446.



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