Lactescent Serum and Abdominal Pain

ANATOLY KAZAKIN, MD; THOMAS HARONIAN, MD; WILLIAM BINDER, MD

From the Case Records of the Alpert Medical School of Brown University Residency in Emergency Medicine

DR. ANATOLY KAZAKIN: Today’s patient is a 34-year-old man with no significant past medical history who experienced worsening abdominal pain over the past 24 hours. The pain was localized to the epigastrium and radiated to his back. The patient had one episode of non-bloody, non-bilious vomiting. He denied any increase in his alcohol consumption but routinely had 4-6 drinks per night. The patient did not report any ill contacts, and denied fever, chest pain, shortness of breath, melena, or hematochezia. The patient did not use any prescription or over the counter medications.

DR. PAUL PORTER: Could you please describe the patient’s physical exam?

DR. KAZAKIN: The patient was an alert adult male who appeared uncomfortable and anxious but was in no respiratory distress. His blood pressure was 116/71 mm Hg, and he had a pulse of 130 beats per minute. His respiratory rate was 16 breaths per minute, his oxygen saturation was 95 percent on room air, and his temperature was 37.2 C, rising to 38.6 C in the ED. The patient’s conjunctiva were anicteric. He had a normal S1 and S2, and his distal pulses were equal bilaterally. His abdomen was tender in the epigastrium and upper quadrants, with guarding but no rebound. He had no evidence of xanthomas, xanthelasma palpabrum, or arcus senilis and the remainder of his exam was normal.

DR. JAMES RAYNER: What were your concerns and differential? What further testing was performed?

DR. KAZAKIN: The patient’s history and physical exam were strongly suggestive of acute pancreatitis. Life-threatening entities such as aortic dissection, abdominal aortic aneurysm and esophageal rupture may mimic this presentation. Alternative diagnoses such as hepatitis, peptic ulcer disease, and partial small bowel obstruction, were considered. However, during phlebotomy, we noticed the patient had lactescent, (milky) appearing serum, suggesting triglyceridemia. Appropriate studies were sent and the patient’s lipase was 1235 IU/L, triglycerides 4791 mg/DL, WBC was 7.9, and creatinine was 0.99 mg/DL. Elevated triglycerides may falsely normalize amylase levels and cause pseudohyponatremia, but the patient’s other labs were unremarkable.

DR. ELIZABETH SUTTON: Did you perform any imaging? How do you determine the severity of this patient’s presentation of pancreatitis?

DR. WILLIAM BINDER: Because clinicians routinely underestimate disease severity, a number of prediction rules have been developed regarding the course of pancreatitis and potential for complications. Ranson’s and the modified Glasgow (Imrie) scores evaluate disease severity in acute pancreatitis but require 48 hours of data collection. The Acute Physiology and Chronic Health Evaluation (APACHE) II and III scoring system is poorly predictive at less than 24 hours and is cumbersome. The modified Atlanta classification for pancreatitis distinguishes between mild, moderately severe, and severe pancreatitis but again, requires 48 hours and thus has limited utility in the emergency setting. The recently developed determinant-based severity classification similarly requires 24 hours of data collection to differentiate severity. About 15 percent of patients with acute pancreatitis develop severe pancreatitis. Our patient’s initial Ranson score was 0, and his APACHE II score was a 5. Despite these scores, the patient had evidence of the systemic inflammatory response syndrome (heart rate > 90 and temperature of 38.6) and had the onset of symptoms within the previous 24 hours. SIRS criteria and acute onset of disease are predictors of severe pancreatitis and indication for imaging. An abdominal ultrasound was negative for cholelithiasis or choledocholithiasis, but a subsequent CT revealed necrosis of the pancreatic tail with peripancreatic and perihepatic low density ascites. Fluid tracked along the left paracolic gutter into the pelvis and there was a small left pleural effusion. Using both the CT severity index and the modified CT Severity index the patient’s score was a 5 or 8, suggesting an associated mortality rate ranging from 7 to 20 percent.

DR. PATRICK SULLIVAN: What is the overall incidence of pancreatitis? Was the patient’s use of alcohol the cause of his pancreatitis?

DR. KAZAKIN: The estimated annual worldwide incidence of acute pancreatitis ranges from 5.4/100,000 in England to 70–80/100,000 in the United States. Since the 1980s there
Insulin was continued in the ICU. Gemfibrozil was initiated on hospital day 2. Within 48 hours the patient’s triglycerides decreased to 780 mg/DL. His hospital course, however, was complicated by recurring fevers. Repeat imaging did not detect an abscess or pseudocyst, and the pancreatic necrosis appeared stable. The patient’s hospital course lasted 12 days and subsequent outpatient visits revealed no genetic explanation for his presentation. He has been continued on gemfibrozil and his most recent triglycerides were 177 mg/dl.

Acute pancreatitis may result from excess triglycerides when levels are greater than 1,000 mg/dl. Over five million Americans have triglycerides above this threshold. There are several mechanisms postulated regarding the cause of pancreatitis in patients with hypertriglyceridemia. One theory proposes that triglycerides are hydrolyzed by pancreatic lipase, leading to increased levels of FFA that exceed the binding capacity of albumin. Subsequently, micelles are formed that attack platelets, vascular endothelium and acinar cells, thereby causing ischemia and pancreatic injury. The resulting acidic environment potentiates FFA toxicity. An alternative theory suggests that plasma hyperviscosity due to increased chylomicrons leads to ischemia and acidosis in pancreatic capillaries. There is also emerging evidence for genetic mutation in transport and regulation factors.

**DR. ANTHONY NAPOLI:** How did you manage this patient in the emergency department?

**DR. KAZAKIN:** In the ED, the patient received multiple doses of hydromorphone for pain as well as three liters of normal saline. Despite this, he remained persistently tachycardic to the 120s. Aggressive fluid resuscitation is one component of Ranson’s criteria but the development of a positive cumulative fluid balance has been shown to raise the risk of intrabdominal hypertension and significantly increase the risk for abdominal compartment syndrome. An insulin drip was initiated and the patient was transferred to the medical intensive care unit. The use of insulin appears to be safe and effective in the management of hypertriglyceridemia-induced acute pancreatitis. Insulin appears to stimulate LPL leading to acceleration of chylomicron degradation. In animals, insulin has been shown to increase mRNA of LPL. Heparin was formerly used because it stimulates the release of endothelial LPL into circulation. However, heparin increases hepatic degradation of lipoprotein lipase, thereby depleting plasma stores, causing a rebound in triglyceride levels. Plasma exchange therapy has also been studied but debate continues regarding the timing, best exchange fluid, and cost of apheresis.

**DR. JEFF FEDEN:** What was the clinical course for the patient?

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**FINAL DIAGNOSIS:** Hypertriglyceridemia acute pancreatitis

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**DR. THOMAS HARONIAN:** Today’s patient had remarkably elevated triglyceridaemia. What are the causes of hypertriglyceridemia? When does it manifest as acute pancreatitis and what are the complications?

**DR. KAZAKIN:** There are many causes of hypertriglyceridemia involving both primary and secondary disease processes. Inherited defects in the proteins or enzymes involved in the processing of lipids are defined by the Fredrickson classification system. Type I (high chylomicrons) is autosomal recessive and presents in infancy. Type IIb (familial combined hyperlipidemia) and IV (autosomal dominant familial hypertriglyceridemia with elevated VLDL) are the most common dyslipidemias in the United States, accounting for 85 percent of cases. Type IV and V (high chylomicrons and VLDL) are associated with severe hypertriglyceridemia and are predisposed to acute pancreatitis. Type IV usually requires another factor – diabetes, alcohol, hypothyroidism, and numerous medications such as thiazide diuretics or beta blockers – to raise serum triglyceride levels and trigger acute pancreatitis in susceptible individuals.

Over 75 percent of cases of hypertriglyceridemia-induced acute pancreatitis occur in chronic alcoholics or poorly controlled diabetics. Alcohol may directly cause elevated triglycerides or simply exacerbates an underlying genetic hyperlipidemia. In type I diabetes, the ability of LPL to reduce triglycerides into free fatty acids (FFA) is diminished, whereas in type II diabetics insulin resistance leads to increased production and reduced clearance of triglycerides.

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References


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