OPEN

American Journal of Gastroenterology Publish Ahead of Print

DOI: 10.14309/ajg.0000000000003180

Guidelines in Practice: Management of Acute Pancreatitis

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Acute pancreatitis (AP) is a common yet polymorphic disease that requires clinicians to be vigilant early in the course. From benign, self-limited abdominal pain to a systemic inflammatory syndrome resulting in pancreatic necrosis and/or organ failure, there is a spectrum of disease. The diagnosis and management of AP is challenging. Through a clinical vignette of inappropriate patient management, we highlight recommendations and advice from the recent guideline for treating this difficult disease[1].

Clinical Scenario

A 52-year-old male presents to the emergency department (ED) with severe, constant, epigastric pain radiating to the back with associated nausea at 12PM. His past medical history is significant for atrial fibrillation, type 2 diabetes mellitus, and chronic kidney disease (CKD) stage 1. He drinks two eight-ounce beers a day for the past year. His medications include weekly subcutaneous injectable semaglutide, metformin, and apixaban. On examination his BMI is 31 kg/m^2, heart rate is 101 beats per minute and blood pressure is 130/80 mmHg. He looks uncomfortable on examination and his tenderness to palpation in his epigastrium. Initial hematocrit is 36, blood urea nitrogen (BUN) 22 mg/dL, and creatinine 1.3 mg/dL (baseline 1.3 mg/dL), lipase of 2000 IU/L, and triglyceride level 400 mg/dl. Right upper quadrant ultrasound (US) does not show any gallstones.

Diagnosis of and Determination of the Etiology Acute Pancreatitis

The diagnosis of AP in this patient is straightforward. He is presenting with characteristic abdominal pain with a markedly elevated lipase. A computed tomography (CT) scan is not needed in this patient. It will not assist in diagnosis, nor be useful in predicting severity, especially as most patients (80 %) will improve. CT should be reserved for the patient who presents with atypical symptoms and/or mild elevations of the amylase/lipase which could be non-specific.

The etiology of the acute pancreatitis in this patient is not clear. Identifying the etiology is important for potentially preventing recurrent pancreatitis. Biliary and alcohol are the most common causes of AP. While the US is indicated as an initial evaluation of AP, the negative exam does not rule out biliary etiology. A stone in the gallbladder may have passed to the common bile duct and be missed by the US whether it has or has not passed to the duodenum. While initial US may be negative, given prevalence of biliary pancreatitis the exam should be repeated on an outpatient basis if no other etiology is found. Alcohol is a common cause of acute pancreatitis, but requires a relatively large amount of alcohol (50 grams) consumption

over multiple years to cause pancreatic disease[2]. Could a medication, such as semaglutide, have caused the AP? Not likely, as there is little evidence that most medications cause AP. [3] Although the triglyceride is lower than 1000 mg/dl, an outpatient repeat evaluation will be needed. Given the patient's age, there is a small but real risk for a tumor causing AP, an outpatient MRCP should be performed if no etiology is identified. It is common that no etiology is identified. Such patients are correctly identified as having idiopathic AP whose further management is complex and controversial.

Clinical Scenario Continued

*The patient undergoes a computed tomography (CT) scan that shows interstitial pancreatitis **(Figure 1)**. After imaging returns, he is diagnosed with acute pancreatis at around 6PM, made NPO, given 1L of Lactated Ringer's (LR). He is admitted to a non-monitored bed in the hospital but due to staffing remains in the ER for several hours. After transfer, he is evaluated by the medical team at 12AM. He has persistent pain, but still appears diaphoretic on exam. His heart rate is 110 -120 beats per minute and blood pressure is 110/80. The medical team considers the tachycardia to be related to underlying atrial fibrillation. Additionally, given his history of CKD, a fluid bolus is deferred, and he is started on 10cc/kg/hr LR. Overnight, tachycardia persists, laboratory tests completed at 9AM show a HCT of 45, BUN of 30 mg/dL, and creatinine of 2.1 mg/dL. Due to concerns for worsening pancreatitis, he is given one liter of LR and rate of LR infusion is increased to 15cc/kg/hr.*

Do Not Miss the Goal Therapy

This clinical scenario highlights two of the most important factors of managing patients with acute pancreatitis: fluid resuscitation and vigilance. While most patients with AP have a mild course, approximately 20% of patients will develop a complicated course. It is impossible to predict which patients will develop acute organ failure or necrosis early in the course of AP. However, there are many risk factors for developing severe disease that should have been identified by the clinicians caring for this patient, including co-morbidities (cardiac and renal disease), obesity, and the elevated BUN. This patient would have benefited from a monitored bed and closer observation, better vigilance. Evaluating vital signs more frequently and repeating the BUN and HCT at 6 hours after admission would have assisted in identifying and, by adjusting intravenous (IV) hydration, correcting the subsequent hypovolemia as it progressed.

While there is ongoing debate on exact rates and volumes for initial resuscitation, IV hydration is critical to the management of acute pancreatis[4,5]. This patient is likely trapped in the cycle of pancreatic inflammation causing fluid extravasation, relative pancreatic ischemia, followed by worsened pancreatitis and fluid extravasation, all in setting of hypovolemia from third spacing. **(Figure 2).** The only treatment for this is restoring pancreatic perfusion with early moderately aggressive IV hydration. Although "Goal Directed Fluid Resuscitation" had been recommended, the problem as shown by this case study is that too often "the goal" of normalizing vital signs, preventing the development of SIRS, decreasing BUN and HCT are not met. Clinicians should focus on "Do Not Miss the Goal Therapy" in preventing the development of moderately severe or severe AP.

The recent landmark "Waterfall" trial highlights the importance of close monitoring, vigilance in AP. This study included "check points" at 3 hours in patient with AP, close monitoring to determine the volume of intravenous hydration. This was shown to be more important than dogmatically providing large volumes of fluids[6]. While this can be challenging in busy clinical settings, close monitoring is often only needed for the first 24 -48 hours as thereafter patients typically will either start to improve or begin to show signs of severe disease.

This case also shows the need to partner with our Emergency Department colleagues to ensure vigilance (mainly ensuring the principles of moderately aggressive IV hydration) are followed even in busy emergency rooms. We also need to work with the ICU and hospital administration to advocate for patients with acute pancreatitis with multiple risk factors for severe disease being placed in a monitored setting with a safe nursing ratio and frequent vitals.

Clinical Scenario Continued

*Over the next 18 hours the patient becomes progressively more tachycardic, short of breath and hypotensive. Due to acute worsening of the patient's clinical status, CT imaging is obtained which shows pancreatic necrosis (**Figure 3**). After transferring to the intensive care unit (ICU) for further management, he was found to be obtunded and hypotensive requiring both ventilator and vasopressor support. Interventional Radiology (IR) and Surgery are consulted.*

Management of Severe Acute Pancreatitis

This patient has unfortunately progressed to moderately severe acute pancreatitis defined by the presence of pancreatic necrosis. After the organ failure persists greater than 48 hours, he has severe acute pancreatitis. At this point, the management will be complex. Supportive care, nasogastric enteric feeding, and a multidisciplinary approach to his care will be needed. IR and surgical intervention will rarely be needed over the next several weeks. If infected necrosis develops, a conservative approach with antibiotics that penetrate pancreatic necrosis should be initiated. Due to the complexity of managing patients with severe AP, complicated by pancreatic necrosis, consideration should be made to transferring this patient to a more experienced medical center.

Conclusion

The early management of patients with AP depends on vigilance and early moderately aggressive intravenous hydration guided by "Do Not Miss the Goal Therapy." We strongly advocate for the importance of close monitoring vital signs, and avoid a rising BUN, HCT, and/or the development of SIRS. Managing patients with AP requires careful identification of risk factors for severe disease, initiation of moderately aggressive intravenous hydration and frequent, thoughtful, reassessment of the patient, especially in the first 48 hours.

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Figure 1. Contrast enhanced computed tomography (CT) showing interstitial acute pancreatitis.

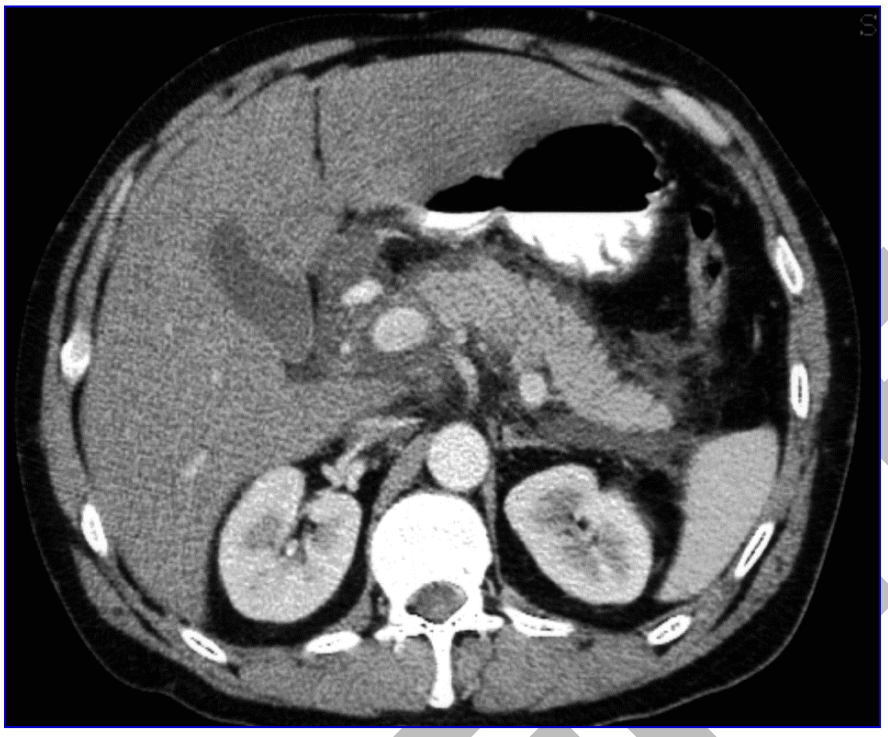

Figure 2. The role of moderately aggressive intravenous hydration in preventing pancreatic necrosis and severe acute pancreatitis (created using Biorender).

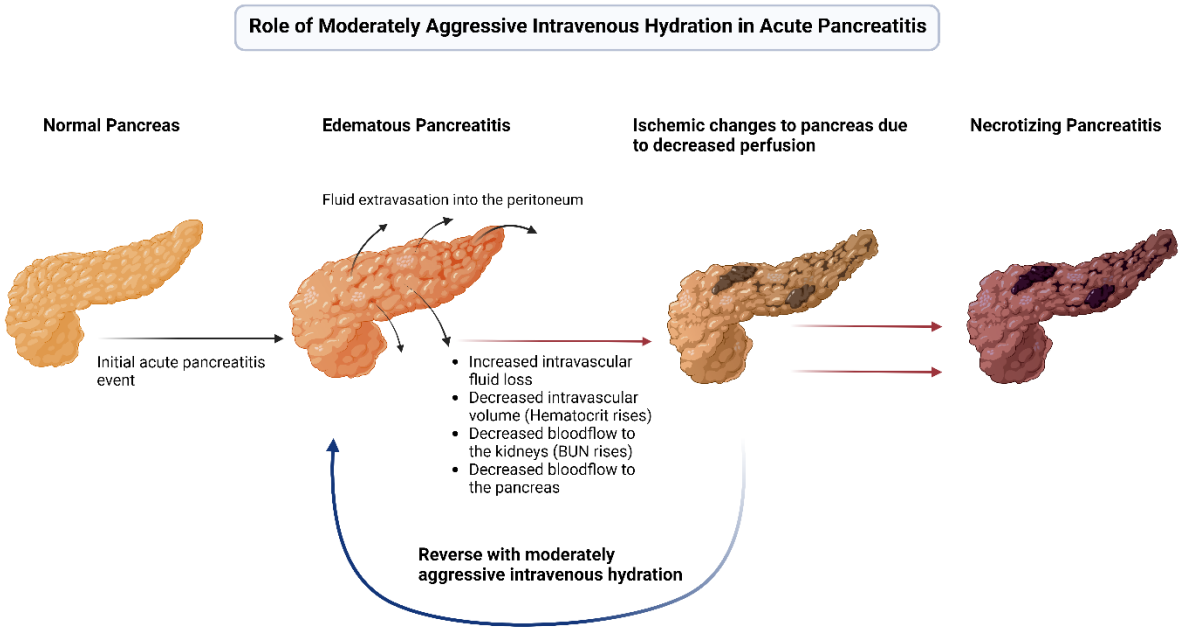

Figure 3. Contrast enhanced computed tomography (CT) showing pancreatic necrosis.