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Acute Pancreatitis and Fluid-Filled Collections

Etiology and Endoscopic Management

ABSTRACT

Acute pancreatitis is an inflammatory process of the pancreas, which can range from a localized inflammatory process to a systemic response, resulting in sepsis and multisystem failure. Pancreatic fluid collections are a complication of pancreatitis. Treatment of these fluid collections is dependent on correct classification. The 2012 Atlanta Criteria divides fluid collections into four categories: acute peripancreatic fluid collections, pancreatic pseudocysts, acute necrotic collections, and walled-off necrosis. Endoscopic ultrasound-guided management of chronic fluid collections is currently the preferred treatment modality. Endoscopy nurses need to be aware of their role in this treatment approach. Continued research in this area will lead to both advancements in equipment and treatment options.

Acute pancreatitis (AP) is associated with a localized inflammatory process of the pancreas involving premature activation of digestive enzymes within the pancreatic acinar cells. This leads to autodigestion of the pancreatic tissue itself, and a complicated progression from local inflammation to a systemic response and potentially to sepsis and multisystem failure (Kambhampati, Park, & Habtezion, 2014). Symptoms may include a sudden onset of upper abdominal pain, nausea, and vomiting. Laboratory results generally show elevated levels of pancreatic digestive enzymes in the blood and urine (Hamada, Masamune, & Shimosegawa, 2016). Most patients have a mild disease course that remains a localized inflammatory process of the pancreas and resolves spontaneously. More severe disease develops in 10%–20% of patients and may include necrosis and organ failure (Hamada et al., 2016). The mortality rate for AP may be as high as 10%–30% primarily because of multi-system failure; thus, a multidisciplinary approach is required (Li, Yang, Huang, & Tang, 2014).

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Background

In the United States, AP is the most common cause of gastrointestinal hospitalizations, with a cost of over $2.6 billion annually (Vujasinovic et al., 2015). The most common causes of AP are biliary gallstones and alcohol consumption (Vujasinovic et al., 2015).

Acute pancreatitis can be divided into three phases. During phase one, trypsin is prematurely activated, which then can activate a variety of harmful pancreatic digestive enzymes. In phase two, an intrapancreatic inflammatory process occurs through a variety of pathways and mechanisms. Phase three is the most severe and includes extrapancreatic inflammation. This phase may also include acute respiratory distress syndrome, which is often fatal. In about 80% of patients with AP, the symptoms are generally mild, but in 10%–20%, the pathways of inflammation lead to systemic inflammatory response syndrome, which predisposes patients to multiorgan dysfunction, pancreatic necrosis, or both (Chang, 2014).

"Stratifying the severity of AP is necessary to identify AP patients requiring intervention" (Wei,

Gui, Wahn, Hu, & Zhang, 2016). Organ failure and infected necrosis are important to distinguish to guide patient management and evaluate the severity of AP. A recent study showed success rates in treatment of symptomatic sterile and infective pseudocysts as 93.5%, and rates only 63.2% for walled-off pancreatic necrosis. They found that clinical outcomes were directly related to the type of fluid collection, so accurate distinction is key (Bang & Varadarajulu, 2014).

Pancreatic Fluid Collections

Pancreatic fluid collections are a complication of the pancreatitis process in which fluid leaks out of the pancreatic duct and forms a fluid collection. The percentage of patients with pancreatitis episodes, which develop pancreatic fluid collections, is 5%–15% (Tyberg et al., 2016). The Classification of Atlanta 2012 established a classification system universally applicable for defining the local complications of AP (Wei et al., 2016). Fluid collections are divided into four categories: acute peripancreatic fluid collections, pancreatic pseudocysts, acute necrotic collections, and walled-off necrosis (WON) (Ruiz-Clavijo, Gonzalez de la Higuera, & Vila, 2015).

Acute peripancreatic fluid collections develop in the first phase of AP and lack a wall of granulation or fibrous tissue. These collections purely contain liquid. Most of these collections resolve spontaneously and require no treatment. In a recent study of over 300 patients with AP, acute peripancreatic fluid collections developed in 42.7%. In over 69% of the patients, the fluid collection resolved spontaneously. This same study quoted pancreatic pseudocyst formation in only 14.7% of those with the initial fluid collection (Ruiz-Clavijo et al., 2015).

Pancreatic pseudocysts are the second classification of fluid collections and develop when an acute pancreatic fluid collection forms a wall and persists for greater than 4 weeks. The revised Atlanta Classification of 2012 defines a pseudocyst as encapsulated without the presence of solid debris (Tyberg et al., 2016). The pseudocyst is thought to form by obstruction of the main pancreatic duct or its branches, which facilitate its chronicity (Ruiz-Clavijo et al., 2015).

In one study, spontaneous resolution pseudocysts occurred in 26.3% and a decrease in size, which then required no treatment occurred in 57.9% (Ruiz-Clavijo et al., 2015). Only symptomatic pseudocysts are recommended for drainage. Symptoms may include abdominal pain, gastrointestinal obstruction, vascular compression, biliary obstruction, or infection (Tyberg et al., 2016). Because of the low occurrence of complications and mortality and the high incidence of spontaneous resolution, conservative management is recommended if patients are asymptomatic from the pseudocyst (Cui et al., 2013).

Acute necrotic collections, the third classification of fluid-filled collections, develop during the first 4 weeks after onset of AP and contain both fluid and necrotic tissue (Ruiz-Clavijo et al., 2015). Acute necrotic collections do not have an encapsulated wall and therefore are not considered for drainage.

The final category of fluid-filled collections, WON, is derived from an acute necrotic collection, which has formed a fibrous encapsulation greater than 4 weeks. The presence of necrosis is an important prognostic marker (Ruiz-Clavijo et al., 2015). Pancreatic pseudocysts and WON are the most often treated fluid collections because they have the necessary fibrous wall and evolution time required for such treatment.

Treatment options for pancreatic pseudocysts include laparoscopic surgical drainage, percutaneous drainage using CT or ultrasound, conventional transmural drainage as an endoscopic procedure, and endoscopic ultrasound (EUS)-guided transmural drainage (Tyberg et al., 2016). Recent studies comparing surgical and percutaneous drainage to endoscopic management show that the three techniques yield similar technical success and complication rates, but endoscopic therapy was associated with a shorter hospital stay, lower cost, fewer follow-up imaging studies, and better physical and mental health component scores among patients (Tyberg et al., 2016).

Role of the Endoscopy Nurse

The endoscopy nurse should have a good understanding of the EUS-guided cyst drainage procedure. Our physicians begin by reviewing their projected plan of care, including a list of required supplies to ensure the procedure flows smoothly and delays are avoided. Patients receive antibiotics prior to their procedure. Our patients undergo general anesthesia for optimum airway management and prevention of aspiration, and all cases require fluoroscopy guidance.

Our physicians then begin the case with a front-viewing endoscope, enabling them to get a good anatomical view in the stomach and duodenum, locate the optimal site to puncture the cyst, and to ensure there are no unexpected strictures or anatomical issues that may alter our plan. We then switch to a linear EUS scope. Once the cyst is visualized, the endoscopist will puncture the cyst using a 19-gauge aspiration needle, and cyst contents will be aspirated for laboratory analysis. A 0.0345-in × 450-cm Jagwire is then passed through the aspiration needle and coiled with multiple loops for stability inside the cyst cavity.

Once we have established access into the pseudocyst, we assist the endoscopist with dilating the tract with either a through-the-scope (TTS) or balloon dilatation catheter (Hurricane, Boston Scientific). Our team is then prepared to deploy a fully covered metal

stent positioned in the gastric or duodenal lumen and extending into the cyst cavity to allow cyst drainage into the gastrointestinal tract. Finally, we deploy one to two double pigtail plastic stents inside the metal stent, using them to anchor the metal stent and prevent stent migration.

The result of endoscopic drainage of WON is less effective. Removal of the necrotic tissue (necrosectomy) is usually performed when the initial endoscopic drainage has not been successful (Ruiz-Clavijo et al., 2015). As with endoscopic pseudocyst drainage, an EUS scope is used to access the cyst, a fistulous tract is created, however then the tract is dilated to allow passage of an endoscope into the collection cavity. Mechanical cleaning and hydrogen peroxide irrigation can be utilized to remove necrotic debris (Tyberg et al., 2016).

Conclusion

Acute pancreatitis is a common inflammatory process with a highly variable clinical course (Cho, Kim, Chung, & Kim, 2015). Properly classifying the severity of AP is necessary to identify patients with AP requiring intervention (Wei et al., 2016). Pancreatic fluid collections are a complication of pancreatitis. When treatment is required, the endoscopic approach has proven successful. As an area of continued interest and research, we can continue to expect advancements in both equipment and treatment approach. ✪

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