Overcoming Ductal Block: Emergency ERCP and Sphincterotomy Plus Common Bile Duct Stenting Improves Therapeutic Outcomes in Severe Gallstone Pancreatitis

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Abbreviations

CBD	Common bile duct
ERCP	Endoscopic retrograde cholangiopancreatography
ES	Endoscopic sphincterotomy
UDCA	Ursodeoxycholic acid

Though acute gallstone pancreatitis, a serious complication of gallstone disease accounting for 40–60% of cases of acute pancreatitis in some populations, is associated with significant morbidity and mortality [1], only 3–7% of patients with gallstones develop pancreatitis. Since a common biliary and pancreatic channel entering the ampulla of Vater frequently exists, acute pancreatitis is often triggered when a migrating gallstone obstructs the pancreatic duct [2]. Acute gallstone pancreatitis is often caused by small stones (<5 mm in diameter) and by biliary sludge and microlithiasis [3] since these small or microscopic stones are more likely than large stones to pass through the cystic duct and obstruct the ampulla. Since cholelithiasis is more prevalent in women than in men, gallstone pancreatitis is more common in females [3].

Gallstone pancreatitis is due to a migrating stone that obstructs the pancreatic duct by impacting in the distal bile

duct, thereby increasing pressure in the pancreatic ducts, eventually damaging ductal and acinar cells. Severe pancreatitis often causes local inflammatory complications, a systemic inflammatory response, and even sepsis. Animal experiments have revealed that ligation of the pancreatic duct causes severe necrotizing pancreatitis and that decompression of the ductal system within three days prevents progression to acinar cell necrosis and severe inflammation. Cholecystectomy and choledocholithotomy prevent recurrence in patients with gallstone pancreatitis, confirming the cause-and-effect relationship [4, 5].

Cholecystectomy is routinely performed in patients with gallstone pancreatitis; if common bile duct (CBD) stones exist, choledocholithotomy should also be carried out [4, 5]. Furthermore, surgery should be performed as soon as the acute inflammatory process has subsided and the patient has recovered. A second potential indication for surgery in severe pancreatitis is debridement of pancreatic necrosis, i.e., necrosectomy, or drainage of a pancreatic abscess. Nevertheless, surgery for severely infected pancreatic necrosis is associated with a mortality rate of 15–75%, especially within the first few weeks of the attack in high-risk patients and in the elderly. Delaying surgery beyond the fourth week in patients with severe necrotizing pancreatitis is associated with a lower mortality rate. Furthermore, gallstone removal and biliary decompression can prevent the recurrence of acute gallstone pancreatitis and pancreatitis-related complications. As a result, urgent (within 24 h of admission) endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy (ES) have been widely accepted as the initial treatment of choice [4, 5]. Though endoscopic treatment is especially favored in elderly patients due to the high morbidity and mortality associated with surgical interventions, delayed surgery increases the risk of recurrence of gallstone pancreatitis with consequent increased risk of mortality. Moreover, the multiple episodes of gallstone migration observed in numerous patients implies that repeated passage of gallstones is very likely to be responsible for the

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recurrence of biliary pancreatitis [1]. To solve this challenging problem, it has been proposed that endoscopic insertion of a biliary stent could be a therapeutic option for maintaining continuous biliary drainage and preventing stone impaction in the ampulla of Vater with consequent life-threatening complications such as cholangitis, especially in patients at high risk and the elderly.

In this issue of *Digestive Diseases and Sciences*, Hormati et al. [6] performed a randomized controlled study to investigate whether CBD stenting, after emergency ERCP and ES, reduces gallstone migration and symptom recurrence in patients with severe gallstone pancreatitis. Their results showed that during the four-week follow-up, the symptoms of stone migration, recurrence of gallstone pancreatitis, and cholangitis were found in 5% of the CBD stenting group compared with 30% of the non-stenting group, suggesting that CBD stenting following ERCP and ES could safely delay cholecystectomy in these patients by four weeks.

Given that complete endoscopic removal of biliary stones is impossible, especially when large or impacted stones are present, or in the case of a concomitant narrowing of the distal CBD or the ampulla of Vater, ES is essential for newly migrating stones entering the duodenum. Furthermore, the small-sized stones are found in the feces, in association with an apparently functioning gallbladder containing similar stones, indicating that the gallbladder is a major source of the migrating stones [2]. The major function of biliary stents is likely to trap stones within the CBD and to prevent stone impaction in the ampulla of Vater, since endoscopic biliary stenting is often used for large or difficult CBD stones after ERCP and ES [7], which provides an opportunity to subsequently remove CBD stones with minimal invasion [1]. Moreover, CBD stent placement maintains continuous bile drainage, which could reduce the risk of developing biliary sludge and bile stasis while alleviating gallbladder swelling and inflammation.

Some complications caused by CBD stents should be prevented, although few cases were found in the present study mainly due to the small number of the patients [6]. The first complication associated with CBD stents is the recurrence of biliary pancreatitis. Indeed, there are the multiple episodes of migration of tiny stones or microlithiasis, leading to repeated passage of gallstones, responsible for the recurrent crisis of biliary pancreatitis, supported by the appearance of stones in the feces [1]. Furthermore, swollen or inflammatory stenosis of the papilla caused by papillitis and ampullary blockage by biliary sludge or microlithiasis could trigger the recurrence of pancreatitis [8]. Due to these factors, the recurrence of biliary pancreatitis should be considered even if a migrating or impacted stone is not identified by noninvasive imaging diagnostic methods.

The second complication is occlusion of CBD stents, leading to cholangitis. Though the exact mechanism of

blockage is not well understood, stent material, diameter and length, as well as biofilm deposition have all been implicated. The blocked stent should be replaced with a new biliary stent immediately. Cholangitis should be treated with intravenous antibiotics.

The third complication is the dislodgement or migration of CBD stents. Due to complete or incomplete obstruction of the bile duct, displaced stents often cause cholangitis. Most migrated stents pass into the intestinal lumen, with some being impacted in the ampulla of Vater, leading to recurrent pancreatitis. Under these circumstances, the affected stent should be removed and then replaced with a new biliary stent. Additionally, patients should be treated with fluids and antibiotics. Biliary decompression achieved by maintaining continuous bile drainage could help quickly relieve the symptoms of cholangitis and reduce the risk of recurrent pancreatitis.

Ursodeoxycholic acid (UDCA) could promote gallstone dissolution during the biliary stenting period by desaturating supersaturated bile and reducing inflammation in the gallbladder and biliary tract [3]. Although this was not tested in the present study, a recent clinical trial supports this concept, as reported by the same group [9]. Moreover, more research should be pursued regarding whether biliary stent placement prevents the formation of biliary sludge, alleviates inflammation and swelling of the gallbladder, and promotes microlithiasis entering the feces via the ampulla of Vater.

In conclusion, after the initial endoscopic stone removal by ERCP and ES in patients with severe acute gallstone pancreatitis, endoscopic biliary stent placement should be performed since it is a simple and safe technique that serves as a bridge to surgery, providing valuable time for patients to recover from the initial inflammatory insult. These endoscopic interventions offer the possibility of delaying cholecystectomy and choledocholithotomy, to the patients' overall benefit.

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Compliance with Ethical Standards

Conflict of interest The author has no relevant conflicts of interest to disclose.

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