Chapter 5
Commentary: Biliary Manifestations of Chronic Pancreatitis—Critical Uncertainties, Controversies, and Future Considerations

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Terminal biliary stenosis is commonly a challenging complication of fibrosing chronic pancreatitis. In chronic, severe pancreatitis, patients can develop evidence of stenosis of the distal common bile duct due to ductal compression by the inflammatory process in the head of the pancreas. Similar compression and obstruction of the terminal bile duct may be associated with a pancreatic pseudocyst in the region of the head of the pancreas. Although it may be difficult to differentiate the two processes, pseudocyst-related obstruction is ameliorated with pseudocyst drainage. The fibrotic encasement of the terminal bile duct associated with chronic fibrosis in the head of the pancreas requires surgical bypass in order to prevent the consequences of cholestasis, recurrent cholangitis and biliary cirrhosis. Recently endoscopic therapies have been employed in the management of terminal biliary stenosis with variable success. Questions that are worthy of debate are which patients should be treated endoscopically, which patients should be treated surgically, and which patients should be managed expectantly? It is difficult to quantify and clearly define the risk of terminal biliary stenosis in a patient who has a dilated bile duct with minimal elevation in liver enzymes.

When patients with terminal biliary stenosis develop jaundice, pain, or cholangitis, surgical or endoscopic intervention is indicated. Both open and laparoscopic biliary bypass have been utilized in the management of symptomatic biliary stenosis. Open procedures may be safer when other complicating factors such as portal venous occlusion with cavernous transformation of the portal vein are present. Choledochoduodenostomy has a simplicity that makes it safe and effective in the management of biliary obstruction. When peripancreatic inflammation involves the

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proximal duodenum and renders it fixed and immobile the Roux-en-Y hepaticojejunostomy is preferred. Cholecystectomy is undertaken to prevent future complications with cholelithiasis and cholecystitis. Many patients develop small, pigmented gallbladder stones in association with biliary stenosis. When undertaking surgical management of chronic pancreatitis with resection or drainage procedures, evaluation for terminal biliary stenosis is required so that biliary bypass can be undertaken if stenosis is present, even if asymptomatic. Biliary-enteric bypass with should be part of the Puestow, Berne, Frey, or Beger procedure when biliary stenosis is present.

Advances in endoscopic retrograde cholangiopancreatography (ERCP) and endobiliary stent technology have led to increasing use of endoscopic management of patients with symptomatic biliary obstruction associated with chronic pancreatitis [1]. Endoscopic management avoids surgical morbidity associated with open and laparoscopic procedures. Endoscopic drainage involves a biliary sphincterotomy, dilation of the stricture using graduated catheters or hydrostatic balloons, and placement of multiple plastic stents in parallel. The short-term efficacy of endoscopic drainage is high, but its durability is limited by the degree of peri-ductal pancreatic fibrosis. Endoscopic management requires three to four ERCPs to achieve maximal dilation. Fully covered, self-expanding metallic stents may improve outcomes for endoscopic therapy by providing sustained radial expansion of the stricture with an indwelling stent. Utilization of self-expanding metallic stents for benign disease is controversial because of associated problems with long-term stenting. The decision to proceed with endoscopic or surgical treatment of terminal biliary stenosis is usually based on local expertise and clinical factors. Endoscopic therapies are frequently selected for patients with complicated pancreatic disease and medical comorbidities where surgical complications are expected to be high. Stent therapy may improve the underlying medical disorders and assist in making the patient a better surgical candidate. If comorbid conditions are severe, stent therapy may be highly successful in palliative strategies.

Biliary-enteric bypass has been utilized as a safe and effective treatment of biliary strictures for decades. Robert Hermann at the Cleveland Clinic was a proponent of choledochoduodenostomy (CDD) for biliary strictures associated with periampullary malignancy, and we adopted this technique for the management of biliary strictures associated with chronic pancreatitis. In 79 patients who underwent CDD for terminal biliary stenosis associated with chronic pancreatitis, long-term success was achieved in 77 with an operative morbidity of 19 % [2]. The so-called sump syndrome refers to a clinical diathesis of fever, elevated hepatic chemistries, cholangitis, or hepatic abscess due to biliary stasis in the terminal bile duct and reflux of duodenal contents is a reported complication after CDD. With an adequate anastomotic size sump syndrome is a rare event; more commonly sump syndrome is associated with anastomotic stenosis. Other retrospective series of CDD for chronic pancreatitis have reported long-term success rates of 90–100 %.

Choledochojejunostomy (CDJ) is preferred to CDD by many surgeons [3]. CDJ is useful when a fibrotic duodenum is not suitable for anastomosis and is some surgeons' preference to avoid the sump syndrome. CDJ may have less entero-biliary reflux than CDD. On occasion patients with recurrent bouts of cholangitis with a

patent CDD may be converted to CDJ with resolution of cholangitis. Both CDD and CDJ are associated with a small incidence of recurrent cholangitis that may be an indicator of chronic intrahepatic biliary tract disease.

Laparoscopic management of biliary stenosis associated with chronic pancreatitis has been utilized with both CDD and CDJ. Conversion rates may be high but long-term success is expected. Operative morbidity and mortality are influenced by disease severity and underlying medical comorbidities.

Frequently terminal biliary stenosis is not the primary indication for surgery in chronic pancreatitis. In patients in whom pain is the chief indication for operation who have a dilated pancreatic duct, lateral pancreaticojejunostomy may be combined with a CDD. Patients with biliary obstruction and duodenal stenosis have an indication for pancreatoduodenectomy (PD). In patients with an inflammatory mass in the head of the pancreas, a variety of hybrid procedures have been described and evaluated prospectively in head to head comparisons. The Frey procedure, Beger, procedure, and Berne procedure all have strong proponents. Excellent outcomes are reported for all procedures and when biliary stenosis is present, the pancreatic drainage with a Roux-en-Y pancreaticojejunostomy is combined with a hepaticojejunostomy or choledochojejunostomy.

The basic principal of endoscopic treatment of biliary stricture associated with chronic pancreatitis is to maximally dilate the stricture using graduated catheters or hydrostatic balloons, followed by placement of multiple parallel plastic stents [4, 5]. After 3–4 months, stent occlusion rates rise, and repeat ERCP and stent upsizing is undertaken. Experts advocate maintaining patency of the stricture for up to 12 months after embarking upon endoscopic treatment. Patients can assume an average of three to four ERCPs and up to 1 year of therapy in order to achieve stricture resolution. This long-term investment in stent therapy is undertaken to avoid the high recurrence rates seen with short-term stenting. Fully covered, self-expandable metallic stents (SEMS) have features which may produce better long-term outcomes than plastic stents [6, 7]. Because SEMS radially expand within the duct, a sustainable dilation of the biliary stricture and lower recurrence rates are possible. Drawbacks of SEMS include difficulty with removal and specific complications such as acute pancreatitis due to compression of the pancreatic orifice, cholecystitis due to occlusion of the cystic duct, and secondary bile duct compression injury due to an oversized stent. Although comparative efficacy trials are lacking, there is a growing body of literature favors the safety and efficacy of SEMS in appropriately selected patients.

Therapeutic endoscopy is a controversial primary approach to terminal biliary stenosis associated with chronic pancreatitis. Endoscopy can potentially avoid the high reported surgical morbidity. This recommendation is supported by high initial endoscopic success rates. While the durability of endoscopic therapy is inferior to surgery, substantial number of patients will avoid surgery, and those that don't can be salvaged with operation. Judgment in patient selection and technical expertise and experience are the key to good outcomes with stenting strategies.

Surgery is an effective treatment for biliary strictures associated with chronic pancreatitis. In patients with non-biliary complications of chronic pancreatitis

requiring surgery (pancreatic duct obstruction with pain, pancreatolithiasis, duodenal obstruction) surgery is a reasonable primary approach. Biliary bypass can be included with pancreatic duct drainage. Side-to-side choledochoduodenostomy is my preference. It is safe and durable with minimal morbidity. By separating the biliary and pancreatic anastomoses, the risk of a combined biliary and pancreatic leak is diminished which decreases the morbidity of a leak of pancreatic enzymes activated by biliary enterokinase. "Sump syndrome" is an unusual long-term complication of CDD and can be avoided by an adequate anastomotic diameter.

Chronic pancreatitis is a heterogenous disease with different clinical and morphological presentations that depend on environmental, genetic, and anatomic factors. There is great geographic variation in the presentation of the disease as exemplified by the calcific chronic pancreatitis of Southern India and the inflammatory head mass reported in studies from Germany. Thus it is hard to classify and directly compare different management strategies for biliary obstruction associated with chronic pancreatitis. Also unanswered is the risk of cholangitis and biliary cirrhosis associated with terminal biliary stenosis. Certainly the patient with cholangitis and multiple medical comorbidities would be best managed with minimally invasive endoscopic techniques. But what about the asymptomatic patient with mild elevations in serum alkaline phosphatase and bilirubin with common bile duct dilation? What is the natural history of that disorder? Identification of the non-dilatable stricture is difficult and is the crux of patient selection process. When patients have symptomatic terminal biliary stenosis with fibrosing pancreatitis, repeated endoscopic stenting may be needed indefinitely. Choledochoduodenostomy is an attractive long-term solution and may be performed with minimally invasive laparoscopic techniques. However, chronic peripancreatic and peri-duodenal inflammation may make the operation difficult and hazardous. Normal anatomic landmarks may be hidden and simple identification of the inflamed and dilated common bile duct can be challenging. When duodenal fibrosis is severe, mobilization and anastomosis between a fibrotic duodenum and the bile duct may be difficult. In this situation preoperatively placed transpapillary biliary stents are useful to protect the anastomosis post-operatively. Alternatively, Roux-en-Y hepaticojejunostomy may be more prudent when the duodenum is unfavorable for anastomosis. Patients who have cavernous transformation of the portal vein associated with superior mesenteric and portal vein stenosis can safely undergo CDD though increased operative blood loss is expected, and these patients are frequently directed towards endoscopic therapy. An evidence-based approach to biliary strictures in chronic pancreatitis is problematic and patient selection remains grounded in local experience. As new minimally invasive laparoscopic and endoscopic tools and techniques are developed they can be better tested against traditional open surgical techniques in appropriately classified patient cohorts and evidence will replace experience in clinical practice.

Our current practice is outlined in the following:

1. Poor operative candidates

   Endoscopic therapy, consider indefinite placement of SEMS.

2. Reasonable operative candidates, no other chronic pancreatitis-related morbidity

   Endoscopic therapy as first-line treatment
   Surgical intervention for non-response or recurrence following endoscopic therapy

3. Reasonable operative candidates, concomitant CP-related morbidity

   Surgical therapy as first-line treatment

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