Management of Bile Duct Problems

**Bile Duct Obstruction**

Bile duct (or biliary) obstruction occurs for numerous reasons. Causes can include cancerous and non-cancerous processes as well as injuries from medical procedures or operations. Obstruction can occur at different levels of the bile duct tree (Figure 1).

Given the many reasons for bile duct obstruction, a multidisciplinary approach is needed to effectively diagnose and treat patients. At California Pacific Medical Center, our team of surgeons, radiologists, interventional endoscopists and oncologists offer treatment for a wide variety of biliary obstruction cases.

**Figure 1a. The gallbladder lies on the right of the liver. The biliary tree within the liver is referred to as “intrahepatic” while “extrahepatic” refers to the biliary system outside the liver. A bile duct tumor(s) can occur in any of these locations.**

**Cancerous**

The presence of a cancerous lesion(s) within the hepatobiliary system can also lead to bile duct obstruction. In these cases, optimal treatment requires a multimodal approach that includes a surgeon, oncologist and interventionalist (endoscopist and radiologist) and radiation oncologists.

**Liver Lesions**

Cancers of the bile ducts within the liver, liver cancers or cancers metastatic to the liver can cause obstruction of the bile duct system. Diagnosis is usually made by radiographic studies (CT or MRI). Prior to treatment of the obstruction, a full work-up of the lesion to determine the extent of disease is necessary. Additionally, a biopsy of the lesion may be needed, which is usually performed with CT or ultrasound guidance. Imaging of the bile ducts...
within the liver are obtained via radiologic (PTC or percutaneous transhepatic cholangiography) and/or interventional endoscopic (ERCP) procedures. Treatment depends on the extent, location and type of cancer (Figure 1b). An endoscopic ultrasound (EUS) may be required to determine the extent of disease. Interventional approaches can be used to treat the obstruction if the patient is not a surgical candidate.

**Extrahepatic Bile Duct Cancers**
An extrahepatic bile duct cancer refers to all cancers that arise within the bile duct system below the liver (Figure 1b). Diagnosis is usually made by radiological imaging. Further elucidation with ERCP or PTC and EUS may be required. Brushings and subsequent pathological examination of the bile duct help with the diagnosis. Surgical versus interventional approaches are assessed on a patient-by-patient basis.

**Pancreatic Cancers**
Pancreatic cancers can cause obstruction of the bile duct just as it enters the intestine (Figure 1b). Diagnosis is usually made radiographically. Treatment of this patient requires a multidisciplinary approach encompassing surgeons, oncologists, radiologists and radiation oncologists for optimal outcome.

**Non-Cancerous**

**Iatrogenic**
Biliary stricturing (narrowing) or obstruction may be the result of an injury sustained during a medical procedure. For example, a gallbladder operation or endoscopic procedure could cause bile duct injury. Surgeons usually treat a bile duct transection at time of injury if noticed.

Bile duct injuries that do not cause bile spillage but cause strictures are usually treated when symptoms arise. Patients often have pain, fever and/or jaundice, as well as elevation in liver laboratory tests. Operative treatment is usually required.

**Cholelithiasis (Gall Stones) and Biliary Stones**
Gall stones or biliary stones can pass from the gallbladder or liver, respectively, into the common bile duct and proceed into the small intestine depending on their size. As they pass through the biliary tree, these stones may cause obstructions if they are lodged in the bile duct. Additionally, strictures may occur due to repeated trauma to the bile duct lining (Figure 2). Interventional endoscopists can extract lodged stones in the common bile duct tree by performing a procedure called ERCP (endoscopic retrograde cholangiopancreatography). Similarly, strictures can be treated by an interventional endoscopist or interventional radiologist, depending on the site of the problem and issues related to the patient’s surgical candidacy. After stone removal, further operations may be necessary to remove the source of the stones (gall bladder or part of the liver).

**Treatment**

**Cancerous Lesions**
Individuals with cancerous lesions need a multidisciplinary approach from the onset of their work-up. Interventional approaches are used to help diagnose the lesions. Once diagnosed, optimal management is discussed with surgeons, interventionalists and oncologists.
If the patient is deemed a surgical candidate, physicians pursue resection of the lesion followed by biliary reconstruction. These operations depend on the location of the lesion causing the obstruction (liver, bile duct, and/or pancreas). Interventional approaches are usually used in cases in which the patient is not a surgical candidate and the risk of the operation is outweighed by the benefits afforded by surgical intervention (Figure 3).

The mainstay of surgical treatment is to first remove the area of stricture, then reconstruct the biliary system. The most common operation is a Roux-en-Y reconstruction (Figure 4a). The Roux limb is connected to the remnant bile duct outside the liver (Roux-en-Y choledochojejunostomy) or the bile ducts within the liver (Roux-en-Y hepaticojejunostomy) (Fig. 4b). All procedures require close oncological follow-up.

**Non-Cancerous Lesions**

Initial management of benign biliary strictures usually starts with interventional procedures (either endoscopic or radiologic). The physician places stents across the strictures to relieve the obstruction. A patient is then referred for surgical intervention if re-stricturing occurs after the stents are removed. Some patients are referred directly for surgical intervention if there is a low likelihood of interventional approaches working.

**Biliary Leaks**

Biliary leaks result when bile extravasates (leaks) through defects in the bile duct wall. This leakage can occur anywhere within the bile duct system. Most commonly, biliary leaks are the result of medical procedures and operations, or traumatic injuries to the biliary system. The end result is bile leakage into the abdomen or surrounding tissues. Interventional approaches (interventional radiologic procedures and interventional endoscopic procedures) are able to treat a majority of the injuries. Surgery may be needed in some situations.

**Biliary Leaks by Location**

**Hepatic**

Bile duct leaks can occur after a liver operation or trauma in which a portion of the liver is removed or injured. The edge of the cut liver can
leak bile. If this happens, a collection of bile forms at the edge of the liver. This is called “biloma.” Individuals will usually present with pain and fever if the biloma is infected. Treatment usually involves placement of a drainage catheter directly into the biloma by the interventional radiologist to drain the collection. The interventional endoscopist then places a stent into the biliary system adjacent to the leaking duct to allow bile to drain via the normal route rather than leak out. Further surgical intervention is needed if the leak remains persistent.

Common bile duct

Common bile duct injuries can occur during gallbladder operations or endoscopic interventions of the common bile duct. During a gallbladder operation, the common bile duct can be injured or a clip placed on the cystic duct may fall off at a later time leading to bile leakage. If the injury is noticed during the initial operation, the surgeon will fix the bile duct injury with a Roux-en-Y choledochojunostomy. For leaks that are not noticed at the original operation, treatment is similar to that described above for hepatic injuries.

Common bile duct (at the level of the pancreas)

The pancreas is also a site of common bile duct injuries, usually as the result of interventional endoscopy. Surgical intervention with drain placement is required if the patient develops a leak. Sometimes diversion of the bile flow may be needed with a Roux-en-Y choledochojunostomy.

Why Choose Us

Hepatobiliary and pancreas diseases—disorders of the liver, bile ducts, gallbladder and pancreas—form a complex set of medical problems whose treatment often requires equally challenging surgical procedures. At California Pacific Medical Center, we have been leaders in hepatobiliary and pancreas surgery since the founding of our liver transplant program in 1988. Our doctors are closely involved in clinical research and surgical innovation. Annually, our physicians provide care to some 4,000 hepatobiliary and pancreas patients, both in San Francisco and at our network of outreach sites in California and Nevada.

For patients requiring hospitalization, we have a dedicated critical care liver unit, hospitalists who specialize in hepatobiliary disease, physician assistants, on-call anesthesia staff and a specialized O.R. nursing team.

Our hepatologists and hepatobiliary surgeons are members of Sutter Pacific Medical Foundation, a not-for-profit medical foundation that provides primary and specialty care, combining the latest in medical technology with a compassionate touch. Sutter Pacific doctors deliver health care services in San Francisco, Marin, Sonoma and Lake Counties, with additional outreach locations throughout Northern California. The relationship between Sutter Pacific physicians and local Sutter Health facilities helps link both doctors and patients with hospital services, enabling the highest quality care delivery. For more information visit www.sutterpacific.org.

CANCER NAVIGATION SERVICE

Our Cancer Care Navigation Service provides individuals and families assistance with appointment scheduling, patient education and support service referral. Call 1-866-975-COPE (2673) or email patientnavigation@sutterhealth.org.

GENETIC RISK ASSESSMENT

The Cancer Genetic Risk Assessment Program at California Pacific offers individuals with a personal or family history pancreatic cancer the opportunity to learn more about the genetic nature of their disease and whether they may be predisposed to other cancers which they could monitor. Individuals meet with our genetic counselor during which an evaluation of one’s medical and family history is performed, as well as a detailed risk assessment and genetic education. If appropriate, genetic testing may be offered and facilitated by the genetic counselor. A genetic risk assessment may assist in medical management decisions such as aggressive cancer screening and preventive measures. For more information, call the Cancer Genetic Risk Assessment Program at 415-600-5961 or visit www.cpmc.org/services/cancer-genetesting/

For more information

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