

PPIC Closed Claim Case Review

Bile Duct Injuries

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Abstract

Laparoscopic cholecystectomy (LC) is likely the most commonly performed elective digestive tract surgery. Bile duct injuries are rare, but can be a serious complication of this procedure. They occur more frequently when physicians are inexperienced in LC procedures, but can and do happen with the experienced surgeon as well. Injuries can present any-time following the initial surgery. Rapid diagnosis and treatment will determine the morbidity and mortality associated with these events. In other words, the sooner an injury is recognized and treated, the better the outcome.

Overview

We have two separate but similar cases for review.

Case number one involves a claimant with a history of right upper quadrant abdominal pain radiating to her back, especially after she ate. She was referred to the surgeon following a normal upper endoscopy and an abnormal hepatobiliary iminodiacetic acid (HIDA) scan. An LC was performed and the claimant had a good immediate post-operative period. She was discharged home the same day in stable condition.

The following day, the claimant was readmitted with complaints of abdominal pain and jaundice. An attempted cannulation of the common bile duct (CBD) was unsuccessful. The CT scan showed a fairly large low-density mass lesion in the right lobe of the liver. This was thought to be a possible hemangioma, but her PCP confirmed that the liver lesion had been monitored and found to be stable over the previous six years. A percutaneous transhepatic cholangiogram (PTC) found a complete obstruction at the level of the surgical clips. A #6 french drain was placed into the intrahepatic biliary tree and the claimant was stabilized and transferred to another medical center more capable of treating the injury.

The claimant ultimately required a Roux-en-Y hepaticojejunostomy. Also, three clips were identified on the cystic duct stump and three above the juncture of the cystic duct. She tolerated the procedure well.

Case number two involves a claimant who had been suffering right upper quadrant abdominal pain, nausea, vomiting, and diarrhea for approximately six weeks. The patient was diagnosed with chronic cholecystitis and scheduled for an LC. Operative records indicate that the surgeon noted many adhesions from previous surgeries, which reduced visibility during the LC.

The claimant was discharged following surgery, but readmitted nine days later with intense pain, constipation, and fluid retention in the abdomen. Diagnosis was a probable bile leak. An endoscopic retrograde cholangiopancreatograph (ERCP) was performed, but the CBD could not be cannulated. The surgeon placed a drain and then discharged the claimant with a TPN to determine whether the leak would seal spontaneously. There was no improvement.

Almost a month later, the claimant was again readmitted for nausea, vomiting, and dehydration. A CT scan showed increased ductal dilation over the left and right hepatic biliary systems and an occlusion highly suggestive of the common duct. The surgeon discussed the need for another surgery to repair the duct and apologized to the claimant for “putting the clip in the wrong place.” Corrective surgery did not take place for another twelve days. Another surgeon performed a bloc resection of the extra hepatic bile ducts, double hepaticojejunostomies, and Roux-En-Y jejejunostomy. Symptoms improved following surgery and the claimant was discharged one week later.

Expert Opinion

In the first case, the defense expert could not support the surgeon's care. The expert criticized the surgeon for failing to perform an operative cholangiography to distinguish the cystic duct and common bile duct. He also questioned the indications for the surgery, since stones were not found and the operation was based solely on a single HIDA scan.

The expert said a second HIDA should always be performed to guard against error. Finally, he stated that the required Roux-en-Y corrective surgery can be problematic, as 20% of them develop strictures and have to be redone. He also reported that the surgery can lead to liver transplants, which usually occur within two years post-op.

This case settled for \$365,000.

In the second case, the defense expert supported the surgeon's initial evaluation and justification of the LC approach to the procedure. According to this expert, the error occurred because of the surgeon's difficulty with the cystic duct and lack of experience in performing an operative cholangiogram. The expert also felt that the surgeon should have converted to an open procedure due to the reduced visibility from adhesions. It was noted that bile duct injuries are a known complication of the surgery, but that the issue here is that the surgeon did not recognize the injury or take corrective action. This is where the defense expert feels that the surgeon deviated from the standard of care.

This case settled for \$350,000.

Discussion

Serious complications like major bleeding, wound infection, and biliary leaks or other injuries can result from this procedure. In one study with a total of 8,856 LC, serious complications occurred in 2.6 percent of the procedures (Afdhal & Vollmer, 2008). Bowel and liver lacerations can result from limited work space, decreased visualization, and increased use of instruments v touch for identifying landmarks. Serious complications are also seen more frequently in patients who undergo active disease processes like inflammation. Bile duct injuries tend to involve the common bile duct (CBD), common hepatic duct (CHD), lobar hepatic ducts, or segmental hepatic ducts.

Stewart and Way (2003) classify LC bile duct injuries into four groups based on mechanism and injury anatomy.

- Class I injuries result from an incomplete transaction incision of the CBD with no loss of duct. This occurs either because the CBD is mistaken for the cystic duct by the surgeon but recognized before completely transected, or the incision for the cholangiogram catheter in the cystic duct is mistakenly drawn through the CBD.
- Class II injuries include lateral damage to the CHD that eventually develop strictures and/or form fistulas. This is usually due to clip placement or cautery damage.
- Class III injuries result from mistaking the CBD for the cystic duct, not recognizing that the CBD, CHD, right/left hepatic ducts transected and/or resected.
- Class IV injuries occur when the right hepatic duct is mistaken for the cystic duct, the right hepatic artery is mistaken for cystic artery, or the right hepatic duct and right hepatic artery are transected, usually from cautery or clips being placed on duct.

Risk Prevention Strategies

Rules of Thumb to Help Prevent Bile Duct Injuries (Way, Stewart, et al., 2003):

- Use high-quality imaging equipment.
- Before starting dissection, use the triangle of Calot for orientation. Find the cystic duct starting at the triangle. Pull the gallbladder infundibulum laterally to open the triangle of Calot. Clear the medial wall of the gallbladder infundibulum. Make sure the cystic duct can be traced uninterrupted into the base of the gallbladder. Open any subtle tissue plane between the gallbladder and presumed cystic duct.

- If the duct is not fully encompassed by a standard M/L clip (9mm) when clipped, then it is probably the common duct and not the cystic duct being dissected.
- Any duct that can be traced without interruption to course behind the duodenum is probably the CBD.
- If there is a large artery behind the duct, the right hepatic artery runs behind the CBD.
- Proximal hepatic ducts fail to opacify on operative cholangiograms.
- Obtain operative cholangiograms liberally. If anatomy is confusing, obtain. If inflamed and adhesions result in difficult dissection, obtain.
- Place clips only on fully mobilized structures. Tips of clips should not have tissue in them.
- Excessive need for clips indicates that LC should become open procedure.
- Anatomic illusions are to be taken seriously, even by the most experienced surgeon.

Summary

The development of LC procedures and their widespread use for elective surgeries has led to increased frequency of biliary injury. Any elective cholecystectomy procedure should be performed only on (a) active symptomatic patients, (b) patients with a history of complications of cholelithiasis, and (c) asymptomatic patients with an increased risk of complications. Following this rule with the knowledge that most injuries are caused by limited work space and decreased visualization can hopefully decrease injuries.

During the LC, the surgeon must attempt to identify the gallbladder and surrounding structures to locate the cystic duct, looking for a pattern to match the mental model of the biliary tree stored in their memory. Usually, the tissues do not have clean uninterrupted borders and are covered by connective tissue, inflammation, and blood. Ultimately, understanding and accepting the limits of human performance gives us the ability to anticipate problems involving human error. Patients commonly assume that the surgeon has the ability to control everything, rendering them the patient's be-all end-all.

When analyzed, though, many examples of human error are not acts of substandard care provided by the surgeon/doctor, just predictable sequelae of normal human performance in high-tech, high-risk settings. Even so, surgeons must use every means possible to ensure that mistakes and misperceptions do not occur, even if that means increasing operative cholangiography to verify the anatomy if unsure due to poor visualization of key landmark structures.

Now in the Virtual Classroom

Review narrated video footage of an LC procedure and related best practices information in *Laparoscopic Cholecystectomy: the Human Cost of the Learning Curve*, a webcast presented by Mika N. Sinanan, MD, PhD, Professor of Surgery at the University of Washington in Seattle.

PPIC designates this educational activity for a maximum of two
AMA PRA Category 1 Credits™.

References

Afdhal, N.H., and Vollmer, C.M., (2008, January 31). Complications of laparoscopic cholecystectomy. *UpToDate*.

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Way, L.W., Stewart, L., Gantert, W., Liu, K., Lee, C.M., Whang, K., and Hunter, J., (2003, April). Causes and prevention of laparoscopic bile duct injuries. *Annals of Surgery*. 237(4), 460-469.