Rare bile duct anomalies

A case report and implications for laparoscopic cholecystectomy

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Abstract. Anomalies of the biliary ductal system are not uncommon, and are of variable clinical significance. A case is reported of an extremely unusual variation, with the cystic duct entering the left hepatic duct. Preoperative delineation of the anomaly in this patient by endoscopic retrograde cholangiography assisted in the subsequent performance of a safe laparoscopic cholecystectomy. Awareness of potential biliary variations is one factor in avoidance of ductal injuries during laparoscopic surgery.

Key words: Biliary anomalies – Laparoscopic cholecystectomy

Variations in the standardly described anatomy of the extrahepatic bile ducts are common, and indeed biliary anomalies have been described in as many as 47% of people, based on operative, cholangiographic, and autopsy studies [1, 4, 7]. Many of these anomalies will have potential significance for the surgeon performing cholecystectomy, as failure to recognize certain anatomic variants may lead to bile leak, fistula, or ductal stricture with resulting morbidity and mortality. These issues have become even more relevant with the development of laparoscopic cholecystectomy, which involves extreme traction on the gallbladder and cystic duct, as well as alteration in operative visualization. Careful and accurate identification of the cystic duct is essential in performing a safe laparoscopic cholecystectomy and potential anatomic variations must be kept in mind by the surgeon. We recently encountered a patient with an extremely unusual anomaly, with cystic duct drainage into the left hepatic duct.

Case report

A 75 year old black female presented to the hospital with a 24 hour history of shaking chills and right-upper-quadrant abdominal pain. Examination showed a temperature of 38.7°C and a tender right upper quadrant. Initial laboratory data showed a T.Bili of 1.8, SGOT 253, SGPT 453, and normal amylase. Ultrasound examination revealed choledolithiasis with a normal-caliber common duct. The patient was begun on intravenous antibiotics. Repeat bilirubin the following day was 2.9 and the patient subsequently underwent ERCP. The cholangiogram showed no evidence for choledocholithiasis, however, it did suggest a relatively low bifurcation of the common duct and possible cystic duct insertion on the left side (Fig. 1). The bilirubin level normalized over the next 48 h and the patient underwent laparoscopic exploration. The cystic duct was carefully identified crossing over the right hepatic duct and intraoperative cholangiography confirmed drainage into the left hepatic duct (Fig. 2). Cholecystectomy was completed without difficulty.

Comment

The anatomy that a surgeon faces when performing a cholecystectomy involves complex relationships between the hepatic artery, portal vein, gallbladder, and extrahepatic biliary tree. Anomalies and variations in this area often occur and the normally described anatomy will be found in only 50% or less of patients [2]. Variations in the extrahepatic bile ducts are particularly frequent and are felt to result from embryologic malformations, through incomplete absorption, malrotation, or abnormally timed separation of the ductal portion of the embryonic hepatic diverticulum [4, 6]. The hepatic ducts may vary in level of convergence, number, course (e.g., drainage into the gallbladder), or presence of accessory bile ducts. The most frequent of these anomalies are accessory ducts, which occur in 2–28% of cases [1, 4, 7]. Many of these ducts will
have little clinical significance. However, larger accessory ducts, if not identified, may be transected or ligated, resulting in bile leak, fistula, or stricture [3, 5].

Anomalies involving the cystic duct include its absence or duplication, each of which is extremely rare, or variations in its course, length, and pattern of insertion into the common bile duct or hepatic ducts, which are common [2]. The cystic duct will usually enter the right side of the common bile duct at an oblique angle. However, autopsy studies by Moosman, et. al. [7] found a 20% incidence of anterior or posterior insertion, while cholangiographic analysis by Berci noted 41% of ducts inserting posteriorly and 35% entering in a spiral fashion [1]. A less common, but potentially more significant variant is cystic duct insertion into a hepatic duct. Iatrogenic injury may be more likely in this situation, particularly with a laparoscopic approach, where the smaller caliber of the hepatic duct may be confused with the cystic duct and crossover to the left side can jeopardize the right duct during dissection. Drainage of the cystic into the right hepatic duct has been reported in 0.6–1.6% of cases [1, 9]. The patient described in this report had drainage into the left hepatic duct, and to our knowledge this particular anomaly has been reported only once previously [4]. In retrospect, preoperative delineation of this variant by ERCP in this case most likely reduced the possibility of injury to either hepatic duct.

The advent of laparoscopic cholecystectomy has dramatically altered the surgical approach to symptomatic cholelithiasis and choledocholithiasis. Awareness of the potential anatomical anomalies of the biliary tree is especially important when performing this procedure for several reasons. (1) Routine exposure of the common bile duct is not recommended and identification of its course is more difficult when compared to an open procedure. (2) Extreme superior and lateral retraction of the gallbladder is required, which can lead to distortion of the cystic duct course and relationship to other ductal structures. (3) Laparoscopic transcystic exploration of the common duct for choledocholithiasis is becoming more frequently attempted and performed.

To date, the incidence of ductal injuries has been higher for the laparoscopic compared to the open approach [8]. Many factors may be contributing to this, including inexperience with a new technique ("learning curve"), the above-mentioned technical factors, and use of electrocautery or laser energy for dissection. The routine performance of intraoperative cholangiography has been recommended to help decrease the number and increase the recognition of ductal injuries [1]. We agree with this approach, particularly in light of the high number of biliary anomalies that can occur. Recognition of these anomalies, as illustrated in our case, may help avoid significant iatrogenic ductal injury and its associated morbidity and potential mortality.