Surgical Management of Iatrogenic Right Hepatic Duct Injury after Laparoscopic Cholecystectomy: A Case Report

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Abstract:

INTRODUCTION: Iatrogenic bile duct injuries are most frequently caused by laparoscopic cholecystectomy, which is one of the most common gastrointestinal surgeries in the world. Unrecognized bile duct injuries or even their delayed diagnosis and improper management can result in life threatening complications like biliary cirrhosis, portal hypertension and recurrent cholangitis.

PRESENTATION OF CASE: We present a case of a 23 year-old female who sustained an iatrogenic right hepatic duct injury and subsequently required hilar hepatectomy and Roux-en-Y hepaticojejunostomy.

DISCUSSION: Multiple classification systems have been proposed and used because of the complexity of iatrogenic bile duct injuries. The newly proposed Hannover classification is helpful to categorize the lesion. A multidisciplinary approach by surgeons, endoscopists and radiologists is necessary in the management of iatrogenic bile duct injuries. Many alternatives exist like endoscopic stenting, computed tomography (CT) guided drainage, and surgical repair.

CONCLUSION: According to the literature, Roux en-Y hepaticojejunostomy is the most frequent surgical reconstruction procedure. The complexity of these lesions and the possible severe adverse effects warrant the treatment of these patients in highly specialized centers.

Keywords:
Hepatic Bile Duct Injury; Hannover Classification

1. INTRODUCTION

Laparoscopic cholecystectomy has become the procedure of choice for surgical removal of the gall bladder. Iatrogenic bile duct injuries (IBDI) remain an important problem in gastrointestinal surgery and with laparoscopic cholecystectomy there has been a documented increased incidence of biliary tree injury \([1, 2]\). Gastrointestinal surgeons and gastroenterologists should realize the importance of an early and proper diagnosis of IBDI since biliary cirrhosis and hepatic failure can result due to its delayed diagnosis \([3]\). An incidence of 0.5-0.7% of IBDI has been reported after laparoscopic cholecystectomy \([4]\). The type of treatment for a patient with iatrogenic duct injury is variable depending on the location and degree of injury. Treatment includes endoscopic stent placement, CT-guided drainage to surgical reconstruction. There is a wide range of surgical interventions for the management of IBDI, which allow proper bile flow to the gastrointestinal tract. Few cases requiring surgical reconstruction after iatrogenic
right hepatic duct injury have been reported. We present a case of iatrogenic right hepatic duct occlusion requiring hilar hepatectomy with Roux-en-Y hepaticojejunostomy.

### 2. PRESENTATION OF CASE

The patient is a 23-year-old female who underwent laparoscopic cholecystectomy for symptomatic cholelithiasis. Her post-operative course was complicated by biloma for which a percutaneous drain was placed. Endoscopic retrograde cholangiopancreatography (ERCP) was performed with stent placement resulting in improvements of her symptoms. However, she recurrently had complaints of right upper quadrant pain and jaundice following stent removal; repeat ERCP showed right hepatic duct occlusion. Percutaneous transhepatic-cholangiogram (PTC) was performed and a biliary drain was placed allowing stabilization of her liver function tests. She underwent exploratory laparotomy for possible hepaticojejunostomy but the level of biliary stricture could not be identified. She was subsequently referred to our institution for evaluation.

Repeat ERCP was obtained which confirmed complete occlusion of the right hepatic duct. Ultrasound and Doppler evaluation showed no evidence of hepatic vascular compromise. Contrast enhanced computed tomography (CECT) was also performed to evaluate the hepatobiliary system (Figure 1). The patient subsequently underwent exploratory laparotomy with plans for possible bypass hepaticojejunostomy versus right hepatectomy. Intra-operatively, the common hepatic duct and left hepatic duct were dilated. The right hepatic duct was sclerotic with extensive adhesions and the mid portion of the duct was found to be occluded by multiple surgical clips. The left lobe of the liver was relatively small and given the concern for post-operative hepatic function the decision was made to perform a hilar hepatectomy rather than right lobectomy. The fibrotic right hepatic duct was exposed and excised with good return of bile. An intra-operative cholangiogram confirmed the patency of the right hepatic duct (Figure 2). A PTC drain was placed retrograde and a retro-colic Roux-en-Y right hepaticojejunostomy was then performed.

Post-operatively the patient had gradual normalization of her liver function tests. She had good pain control and return of bowel function and was discharged to home on with her PTC drain in place.
Figure 2. Intraoperative cholangiogram reveals patency of the proximal right hepatic duct, with sclerosis of the mid portion of the duct.

Figure 3. Hannover Classification: Types A - E.

3. DISCUSSION

Iatrogenic bile duct injury occurs most commonly with cholecystectomy[3]. The incidence of biliary duct injury has been shown to occur twice as frequently in laparoscopic cholecystectomy compared to open cholecystectomy. Most injuries occur from misidentification of the cystic ducts, inadvertent division of the common or hepatic bile duct, excessive electrocautery, or excessive clipping [5]. Patients who experience a biliary injury may present with jaundice, fevers, or abdominal pain. We chose to present a case of right hepatic duct injury after elective laparoscopic
cholecystectomy.

As with the patient presented in the case, most cases of iatrogenic bile duct injury are not recognized during primary surgical procedure. Bektas et al completed a retrospective analysis of iatrogenic bile duct injuries in 74 consecutive patients and reported that the injury was detected post operatively in 47 patients (64%) [6]. Multiple imaging modalities assist with diagnosis of an injury. Ultrasound helps distinguish ductal dilation and biloma or fluid collection, percutaneous cholangiography defines biliary anatomy, ERCP and magnetic resonance cholangiopancreaticography all provide an adjunct in the diagnosis and the management of biliary tract injury.

Multiple classification systems are used to help describe iatrogenic bile duct injuries. Classification allows surgeons to choose the most appropriate technique for reconstruction. The Bismuth classification was developed in the era of open cholecystectomy and identified by complete transection of bile duct and resultant proximal stump length [7, 8]. The Strasberg classification is another well-known system which divides bile duct injury into five groups based on presence of leak and the continuity of the bile duct [9, 10]. Bektas et al reviewed iatrogenic bile duct lesions, their treatment and outcomes and classified the present injuries in accordance with previously published classification systems to propose a new classification system: the Hannover classification.” The Hannover classification provides more descriptors of duct lesions compared to traditional systems and includes consideration of concomitant vascular lesions (Figure 3) [6, 9]. Improved classifications of the degree of bile duct injury can improve patient outcomes by aiding in choosing a most appropriate treatment plan.

Concomitant vascular lesions have been reported with a frequency of 11-32 percent [11–13]. Since the right hepatic artery is the primary supply for the central bile ducts, injury to the right hepatic artery should be identified at an earlier stage and should be managed adequately. There was no vascular injury noted in our case.

There is an association between accurate discrimination of bile duct injury using the Hannover classification and incidence of resection of the hepatic bifurcation during hepaticojejunostomy. This is due to the ability of the Hannover classification to easily distinguish between lesions either at or above the hepatic duct bifurcation [6]. We present a case of a Type E4 lesion (referring to stenosis of the right hepatic duct of a segmental bile duct.) This injury was likely secondary to inadvertent clipping of the duct during elective laparoscopic cholecystectomy.

Performing a hepaticojejunostomy when the injury is above the bifurcation of the hepatic duct is more technically demanding as compared to when the injury is below the hepatic duct bifurcation level. Hepatic resection has also been described for patients with high biliary stricture or concomitant arterial transection. Given our patient’s relatively small left hepatic lobe and lack of concomitant arterial injury, the decision was made to perform a hilar hepatectomy with resection of the sclerotic duct and Roux-en-Y hepaticojejunostomy.

Appropriate decision making will affect patient outcome and choice of surgical repair for patients who experience iatrogenic bile duct injury. Pre-operative planning with adequate imaging to define the extent of biliary lesion is useful in adequately classifying the extent of lesions. Utilizing pre-operative modalities to accurately classify bile duct injury may guide surgical planning and lead to improved post-operative outcomes.

4. CONCLUSION

The clinical application of the study is very important especially for the community surgeons to apply this clinical knowledge in their routine practice. Delayed diagnosis of iatrogenic bile duct injuries make the treatment more difficult and is responsible for a more complex course. We present one of the very few cases reported with iatrogenic right hepatic duct injury and its management with resection of the sclerotic duct and a challenging hepaticojejunostomy. Although a number of alternatives exist such as a percutaneous transhepatic-endoscopic stenting procedure or surgical repair, the best treatment remains controversial. The majority of the bile duct injuries seen with laparoscopic cholecystectomy can be prevented if the surgeon adheres to the basic principle that no structure
should be divided or ligated until it is clearly identified. Our study also highlights the importance of intraoperative cholangiography in the management of iatrogenic bile duct injuries.

**CONSENT**

Patient consent was not required for this retrospective case review.

**CONFLICT OF INTEREST STATEMENT**

None of the contributing authors have any financial or personal relationships with people or organizations that could inappropriately influence work on this case report.

**References**


