

Case Report

Laparoscopically Assisted Extrahepatic Cyst Excision and Left Hemihepatectomy for a Type IV-A Choledochal Cyst

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Abstract

Some studies have reported on laparoscopic excision for treating the choledochal cyst, yet there are no reports on laparoscopic surgery for treating type IV-A choledochal cysts that require a liver resection. In this paper, we report on a case of laparoscopic cyst excision combined with left hemihepatectomy and laparoscopy-assisted Roux-en-Y hepaticojejunostomy for treating a type IV-A choledochal cyst. A 51-year-old female was admitted with symptoms of jaundice and cholangitis. Percutaneous transhepatic biliary drainage (PTBD) was done preoperatively for controlling the cholangitis. The imaging studies revealed a type IV-A choledochal cyst with an associated stricture of the left main intrahepatic duct. After the resolution of the cholangitis, total laparoscopic cyst excision and left hemihepatectomy were performed by using the four-port technique, and then a Roux-en-Y hepaticojejunostomy was done by a laparoscopy-assisted method. The total operation time was 420 minutes. The estimated blood loss was 300 mL, and no perioperative transfusion was needed. The tubogram, which was performed through the PTBD on postoperative day 5, showed good patency of the bilioenteric anastomosis and no biliary leakage. The patient was discharged at postoperative day 7 without any complications. This case shows the feasibility of performing laparoscopic surgery for treating a type IV-A choledochal cyst that requires a liver resection. We believe that laparoscopic cyst excision with a liver resection can be one of the treatment options for selected patients with type IV-A choledochal cysts.

Introduction

SINCE THE INTRODUCTION of the laparoscopic cholecystectomy, the improvements of the laparoscopic technique and instruments have facilitated adopting laparoscopy into many fields of surgery. The laparoscopic approach has been applied to biliary surgery for performing various operative procedures, including choledocholithotomy, biliary reconstruction (e.g., cholecystojejunostomy, choledochoduodenostomy, choledochojejunostomy, and choledochocholedochostomy), and choledochal cyst excision.¹⁻⁷ Farello et al.⁸ in 1995 first described performing a laparoscopic choledochal cyst resection with Roux-en-Y hepaticojejunostomy for a type I choledochal cyst. Although this procedure has been documented by only a few reports, the recent reports on the laparoscopic approach for treating the choledochal cyst have showed its technical feasibility and the results have been very encouraging.^{7,9}

However, the reports on laparoscopic surgery for the choledochal cyst have been limited to type I and II cysts. There has been no report on laparoscopic surgery for a type IV-A cyst that requires a liver resection. In this paper, we report on a case of laparoscopic extrahepatic cyst excision combined with the left hemihepatectomy for treating a type IV-A choledochal cyst. Liver resection was performed to eliminate the intrahepatic ductal stricture, which may lead to intrahepatic complications, such as hepatolithiasis, cholangitis, and malignancy.¹⁰⁻¹⁴ To the best of our knowledge, this is the first reported case of an extrahepatic cyst excision combined with a liver resection for treating a type IV-A choledochal cyst that was performed laparoscopically.

Case Report

A 51-year-old female was admitted with symptoms of jaundice and cholangitis. The laboratory findings at admission were as follows: the total bilirubin level was 3.2 mg/dL,

the alkaline phosphatase level was 554 IU/L, the serum amylase level was 498 U/L, and the CA19-9 level was 14 U/mL. Preoperative abdominal computed tomography (CT) showed a fusiform dilatation of the extrahepatic and intrahepatic bile ducts. Percutaneous transhepatic biliary drainage (PTBD) was performed to control the cholangitis. The cholangiography, which was done through the PTBD, revealed a type IV-A choledochal cyst with a fusiform dilatation of the extrahepatic and left intrahepatic ducts, and this was associated with the stricture of the left main duct (Fig. 1). Yet, any anomalous pancreatobiliary duct junction was not identified. Laparoscopic extrahepatic cyst excision and left hemihepatectomy were planned after the resolution of the cholangitis.

Operative procedure

After the induction of general anesthesia, the patient was placed in a supine position with a 30-degree reverse Trendelenburg adjustment. The first (11-mm) trocar was inserted into the subumbilical port after creating the pneumoperitoneum. The second (11-mm), the third (12-mm), and the fourth (5-mm) trocars were inserted at the midline of the subxiphoid area, at the midclavicular line 5 cm below the right costal margin, and at the anterior axillary line below the right costal margin, respectively (Fig. 2). The operator stood at the left side of the patient during the excision of the extrahepatic choledochal cyst.

A routine cholecystectomy procedure (i.e., ligation and severance of the cystic artery and clipping of the cystic duct) was performed, with the gallbladder left *in situ* to provide a handle to lift away the liver. The distal part of the choledochal cyst was then carefully dissected, with monopolar electrocautery and by using a Harmonic Scalpel® (Ethicon, Cincinnati, OH), from the midportion of the cyst to the intrapancreatic portion. After the narrow distal portion of the cyst was identified (Fig. 3), it was then ligated with Hem-o-lok® (Teleflex, Research Triangle Park, NC) clips, and then the cyst was divided. Next, the gallbladder was next dissected from the liver bed. With the distal portion of the cho-



FIG. 1. The cholangiogram through the percutaneous transhepatic biliary drainage site showing a type IV-A choledochal cyst associated with a stricture of the left main duct.

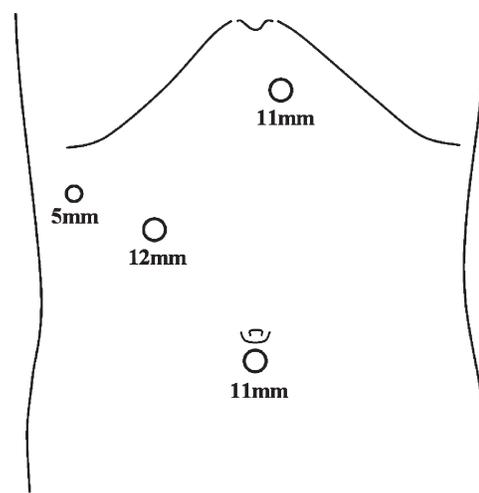


FIG. 2. Positioning of the trocars. The epigastric port was extended for specimen extraction, and a hepaticojejunostomy was then performed through the extended wound.

dochal cyst retracted upward, the proximal portion of the cyst was dissected until the hilum was exposed.

The operator then changed his position to the right side of the patient for the performing of the left hemihepatectomy. After dividing the round ligament, the falciform and left triangular ligaments were sharply dissected until the left hepatic vein was exposed. While lifting the left liver, the lesser omentum attached to the left liver was divided by using a Harmonic Scalpel. The accessory left hepatic artery was found and divided after applying endoclips. After the full mobilization of the left liver, the left hepatic artery and left portal vein were individually isolated and divided after applying Hem-o-lok clips. The hepatic parenchyma was transected, along a line demarcated by the ischemia, by using a Harmonic Scalpel in the superficial portion of the parenchyma and by using CUSA (Valleylab, Boulder, CO) in the deep portion. The large branches of the hepatic veins were controlled with endoclips (Fig. 4). The left hepatic vein was divided by using a linear ENDO GIA (Autosuture, Norwalk, CT).

The resected specimen was completely divided (Fig. 5), and then it was put into a vinyl bag. Next, a Roux-en-Y hepaticojejunostomy was performed by employing the laparoscopy-assisted method. After Treitz's ligament was identified on the laparoscopic view, the upper jejunum, 40 cm distal to Treitz's ligament, was grasped with an intestinal clamp and exteriorized through a 6-cm incision, which was created by extending an epigastric port. The Roux-en-Y hepaticojejunostomy and jejunojejunostomy were manually performed through the incision. Two Jackson-Pratt drains were inserted around the hepaticojejunostomy site and the cut surface of the liver, respectively.

Operative results

The operative time was 420 minutes. The estimated blood loss was 300 mL, and the patient required no intra-operative or postoperative transfusion. The cholangiography done through the PTBD at postoperative day 5 showed good patency of the bilioenteric anastomosis and no biliary leakage. Although it appeared there was a narrowing at the hepaticojejunostomy site (Fig. 6), the PTBD catheter was removed

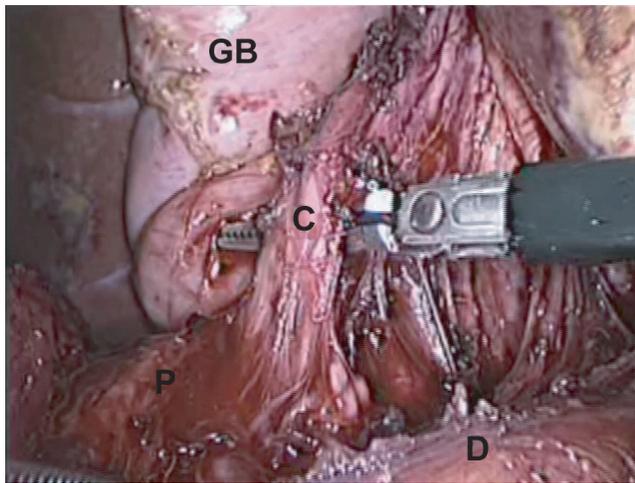


FIG. 3. Laparoscopic view of the dissection of the distal choledochal cyst. C, choledochal cyst; D, duodenum; GB, gallbladder; P, pancreas.

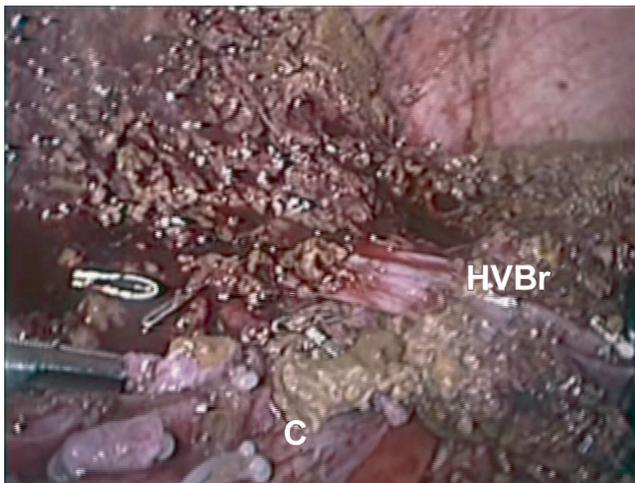


FIG. 4. Laparoscopic view of the exposed hepatic vein branch (HVBr) draining into the middle hepatic vein during the left hemihepatectomy. C, caudate lobe.

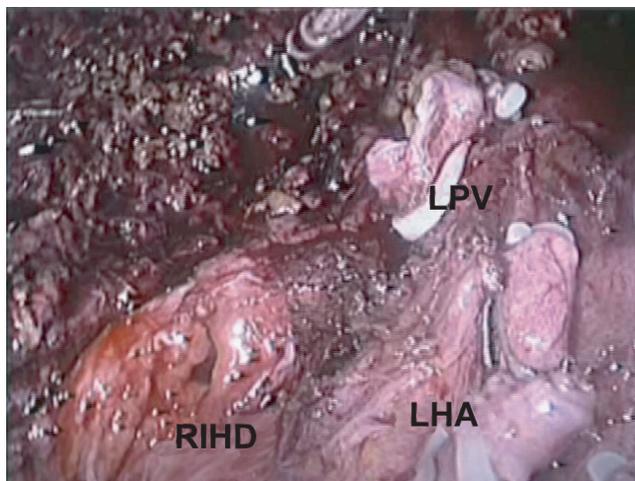


FIG. 5. Laparoscopic view of the right intrahepatic duct (RIHD) after a left hemihepatectomy. LHA, left hepatic artery stump; LPV, left portal vein stump.



FIG. 6. The postoperative cholangiogram that had been performed through the percutaneous transhepatic biliary drainage site on postoperative day 5 shows a patent biliary drainage site without anastomotic leakage.

soon after the cholangiography was performed because there were no abnormal findings on the liver function tests. The patient was discharged on postoperative 7 day without any postoperative complications. The postoperative pathology revealed no dysplasia or carcinoma in the bile duct. The follow-up abdominal CT done during postoperative month 4 showed no remnant cyst or intrahepatic ductal dilations (Fig. 7). The patient is now doing very well after a 13-month follow-up period.

Discussion

According to Todani's classification, choledochal cysts are classified into five types: type I—a solitary fusiform or sacular extrahepatic cyst; type II—a supraduodenal diverticu-



FIG. 7. Computer tomography image at postoperative month 4 shows no remnant cyst and intrahepatic ductal dilations.

lum of the extrahepatic bile duct; type III—an intraduodenal diverticulum of the distal common bile duct or a choledochocoele; type IV-A—multiple extra- and intrahepatic cysts; type IV-B—multiple extrahepatic cysts only; and type V—single or multiple intrahepatic cysts. The treatment of choice for choledochal cysts, except for type V cysts, is to completely excise the extrahepatic component of the choledochal cyst. Total excision of extrahepatic cysts and the Roux-en-Y hepaticojejunostomy are commonly employed for both type I and IV cysts; the commonly employed surgery for type II cysts is the excision of the diverticulum and type III cysts, is a transduodenal excision.

However, the surgical management for the type IV-A choledochal cyst may require a liver resection, if this lesion is combined with an intrahepatic ductal stricture. The ductal stricture seen in a type IV-A choledochal cyst has been reported to have a high risk of postoperative intrahepatic complications, such as recurrent cholangitis, hepatolithiasis, and malignancy, when only the extrahepatic cyst excision was performed.^{10–14} For this reason, it needs to be emphasized that any associated ductal stricture should be relieved by whatever means are feasible during the initial operation. Liver resection has been suggested to be one of the surgical treatments to eliminate the intrahepatic ductal stricture that is combined with a type IV-A choledochal cyst.^{15–18} We performed the left hemihepatectomy prophylactically to exclude the possibility of recurrent cholangitis in the remnant intrahepatic cyst, and this recurrent cholangitis can be caused by the disturbed biliary drainage that is associated with the ductal stricture.

At the time of this operation, we had experienced about 80 cases of laparoscopic liver resection, including cases of major hepatic resections, and some of these operations have been reported on.^{19,20} We have also experienced 10 cases of laparoscopic operation for treating type I choledochal cysts. Based on these experiences, we performed the extrahepatic cyst excision combined with left hemihepatectomy through a total laparoscopic approach. Laparoscopic liver resection is a technically demanding operation that requires the surgeon to be experienced in both laparoscopic and open liver surgery. The risk of incurring major bleeding and air embolism slowed with the development of laparoscopic liver resection, as compared to the other operative procedures. Nonetheless, favorable results have recently been documented with the accumulation of experience in performing laparoscopic liver surgery.²¹ Laparoscopic liver resection will be more widely applied for various disease indications in the near future.

Of all the laparoscopic procedures available for treating the choledochal cyst, the laparoscopic hepaticojejunostomy is a most difficult, time-consuming step due to the difficult suturing; this difficulty is caused by the limited degree of freedom of the rigid laparoscopic instruments, although laparoscopy affords a magnified view of the deeply located bile duct. In contrast, an extrahepatic cyst excision can be accomplished with relative ease. Therefore, some surgeons^{22–24} have adopted the laparoscopy-assisted approach to avoid the technical difficulty and complications of laparoscopic biliary reconstruction. In this present case, we also performed the hepaticojejunostomy through the minilaparotomy that was created for the removal of the liver specimen to decrease the prolonged operation time spent on liver resection, although

we have previously performed the total laparoscopic choledochojejunostomy and choledochocholedochostomy for liver resection.^{5,6}

The laparoscopic approach seems to have several advantages for managing the choledochal cyst. First, the excellent visualization of tiny structures may help precisely dissect a cyst. Second, considering that choledochal cysts are more commonly diagnosed in young women, the cosmetic advantage of laparoscopy can be maximized for these patients. Third, if late postoperative complications occur, such as anastomotic stricture, cholangitis, intrahepatic stones, pancreatitis, and/or malignancy,^{25,26} then a reoperation can be easily performed due to the reduced adhesions, as compared with the open approach. This present case demonstrates that such laparoscopic advantages can be extended, even to a type IV-A cyst that requires a liver resection.

Conclusions

In summary, this case shows that laparoscopic surgery for a type IV-A choledochal cyst that requires a liver resection is feasible, and that this surgery can be safely accomplished. We believe that a laparoscopic cyst excision with a liver resection can provide those selected patients who suffer with type IV-A choledochal cyst with a treatment option, while maintaining the advantages of minimal invasive surgery.

Disclosure Statement

No competing financial interests exist.

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