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A CASE OF CONGENITAL BILIARY DILATATION TREATED BY LAPAROSCOPY-ASSISTED OPERATION

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Congenital biliary dilatation predisposes the patient to increased incidence of cholangiocarcinoma. Therefore, division of the biliary tree from the pancreatic duct and resection of the dilated biliary tree are necessary at early period according to the literature. We have operated on a 58-year-old female with cystic extrahepatic biliary dilatation (4 × 3 cm) and Komi's Type III_{C2} anomalous arrangement of the cholangiopancreatic ducts. The patient underwent laparoscopy-assisted resection of the extrahepatic biliary tree with antecolic roux-en-Y hepaticojejunostomy. The resected specimen had no evidence of bile duct carcinoma. A ^{99m}Tc scintiscan of the biliary duct taken on the 103rd postoperative day showed smooth bile outflow without anastomotic stenosis. As of February 1995, no previous case receiving such laparoscopy-assisted operation has been reported.

With improvement of the method to push the inferior surface of the liver cephalad, such as to use liver retractor or to perform hepaticojejunostomy before resecting the dilated common bile duct, thereby exerting traction through the common bile duct to expose the hepatic hilus, all the operative procedure including hepaticojejunostomy may be carried out laparoscopically. The detail of the procedure is reported with discussion of future improvements.

Introduction

Congenital biliary dilatation is a disease entity that shows various forms of dilated bile duct. Most of these forms are associated with anomalous arrangement of cholangiopancreatic ducts. Such condition predisposes the patient to increased incidence of cholangiocarcinoma. Therefore, division of the biliary tree from the pancreatic duct and resection of the dilated biliary tree are necessary at early period according to the literature.

Although Shisei Hospital is a small hospital in the suburbs, we have been active in laparoscopic surgery from early days of its introduction to Japan. Recently, we have operated on a 58 year-old female with cystic extrahepatic biliary dilatation (choledochal cyst) and Komi's Type III_{C2} anomalous arrangement of the cholangiopancreatic ducts. The operation was laparoscopy-assisted resection of the extrahepatic biliary tree with antecolic roux-en-Y hepaticojejunostomy. The resected specimen had no evidence of bile duct carcinoma. Postoperative recovery was uneventful.

As of February 1995, no previous case receiving such laparoscopy-assisted operation has been reported. With improvement of the opera-

tive procedure and instruments, all the operative procedure including hepaticojejunostomy may be carried out laparoscopically in the near future. The detail of the procedure is reported with review of the literature and discussion of future improvements.

Case

Patient: 58-year-old female.

Chief complaints: abdominal pain, fullness.

Past history: She was treated by a nearby physician for hyperlipidemia since about five years prior to admission.

Present history: She developed CC in the summer of 1994. She was admitted to our hospital for evaluation and treatment. Since diabetes mellitus was immediately diagnosed (fasting blood sugar of 273 mg/dl), she was put on diet therapy and intraabdominal organs were examined.

Status praesens: Her height was 154 cm, weight 57 kg, and nutritional condition was good. On physical examination, no abnormality was found in chest or abdomen. Superficial lymph nodes were not palpable.

Blood chemistry: All data including tumor markers were within normal limits except total cholesterol of 275 mg/dl and serum amylase of 571 IU/l.

Urinalysis: No abnormality was found.

Ultrasonography: The common bile duct showed cystic dilatation. The cystic duce was directly connected to the cyst. A small polyp was observed in the gall bladder. The intrahepatic bile ducts appeared normal (Fig. 1A).

CT: The common bile duct showed dilatation of 4.5 × 3.0 cm in maximal diameter (Fig. 1B).

Endoscopic retrograde cholangiopancreatography: A secondary pancreatic duct was observed adjacent to the distal narrow segment of the common bile duct. This pancreatic duct communicated with the main pancreatic duct of the same caliber, accessory pancreatic duct, and a common duct, consisting Komi's Type III_{C2} anomalous arrangement of the cholangiopancreatic ducts. There were no signs suggesting bile duct tumor or lithiasis (Fig. 1)[1].

From the above findings, we diagnosed that the patient had Komi's Type III_{C2} anomalous arrangement of the cholangiopancreatic ducts without intrahepatic duct dilatation or bile duct lithiasis or carcinoma. The patient was operat-

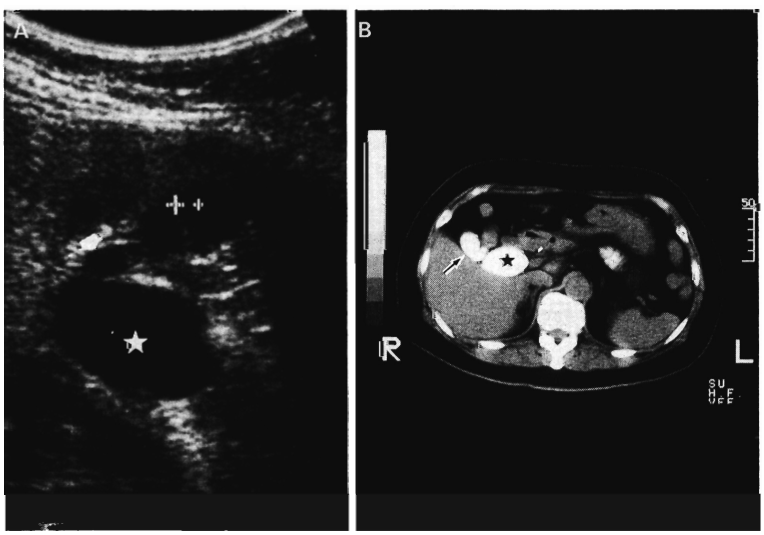

Fig. 1 (A) Ultrasonography revealed dilated common bile duct (☆), dilated cystic duct (⇩) connected to the gallbladder, and small polyp in the gallbladder (++). (B) Abdominal CT revealed dilatation of the common bile duct (★, 4.5 × 3 cm in maximal diameter) and gall bladder (⬇).

ed on October 28, 1994.

Operative findings: Five 12 mm trocars were introduced around the right upper quadrant, in a manner similar to that for laparoscopic cholecystectomy. Pneumoperitoneum of 8 to 10 mmHg was achieved with carbon dioxide gas (Fig. 3A). The jejunum about 40 cm anal from the Treitz' ligament was divided with an automatic suture device (Endo Linear Cutter 60). The oral end was anastomosed side-to-side to the jejunum about 40 cm anal from the divided end with the same device (Endo Linear Cutter 60). Thus the jejunum loop to be anastomosed with the hepatic duct was made. The mesentery was divided using another automatic suture device (Endo GIA 30). The opening in the jejunum from which the automatic suture device was inserted was closed with interrupted sutures of 3-0 absorbable synthetic thread (PDS) using ski needle, and 3 ml of synthetic fibrin glue was sprayed.

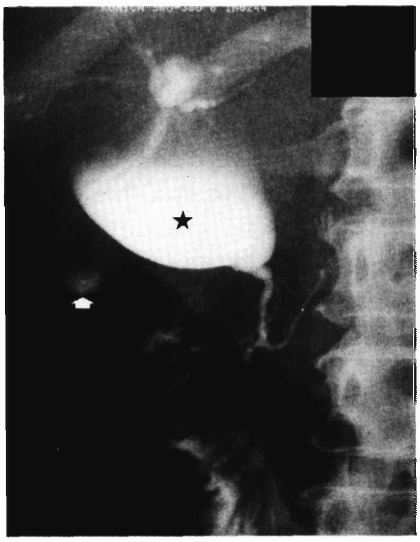

Fig. 2 Endoscopic retrograde cholangio-pancreatography revealed a part of the gallbladder (⇧) and dilated common bile duct (★), consisting Komi's type III_{C2} anomalous arrangement of the cholangiopancreatic ducts.

The adhesions around the gallbladder neck were lysed and Calot's triangle was exposed. Since there were two cystic arteries on the left and right side of the common bile duct, each was divided after putting two clips on the

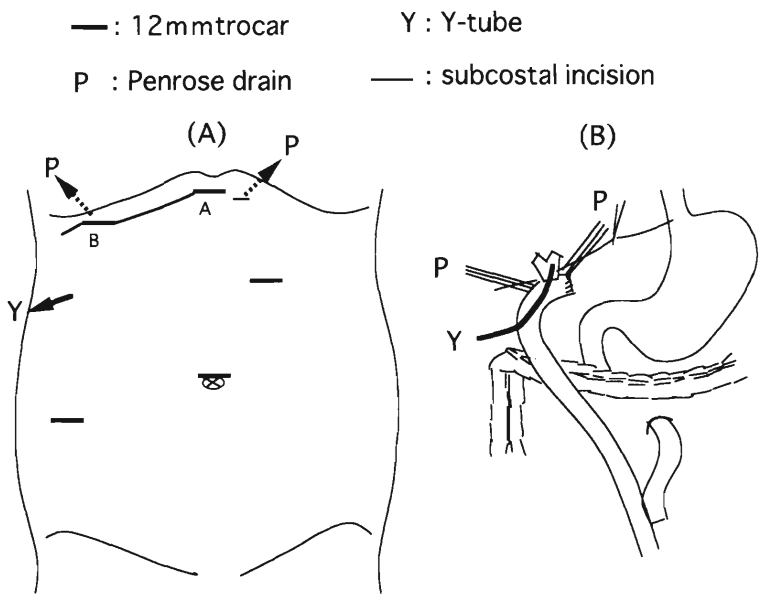

Fig. 3 Schema of the operation
(A) Five 12 mm trocars were inserted around the right upper quadrant.
(B) The reconstruction of the biliary duct was achieved by antecolic hepaticojejunostomy.

proximal side and one on the distal side.

A clip was placed on the gallbladder side of the cystic duct. The cystic duct was cut partially proximal to the clip with microscissors. A tube was inserted from the opening and the bile was sampled. Cholangiography was done using the same tube to confirm anatomy and location. After the tube was removed, the cystic duct was divided between two clips on the proximal side and one on the distal side. The bladder was dissected from the liver bed and cholecystectomy was accomplished.

The dilated choledochus and the narrow distal segment were mobilized from adjacent structures. Intrapancreatic bile duct was dissected till the merging of the pancreatic duct. The choledochus was divided between three clips on the pancreatic side and two clips on the liver side. The cut end on the pancreatic side was further secured with endoloop.

The cut end of the choledochal cyst was pulled ventral and cephalad. The dorsal side of the cyst was freed from the portal vein, hepatic artery, and adjacent connective tissues till the hepatic hilum. The hepatic duct at the hilum was prepared.

The jejunal loop previously made was elevated anterior to the transverse colon, and the gut about three centimeters anal from the jejunal end was cut about one centimeter vertically for anastomosis. A Y-tube for bile drainage was inserted into the jejunal loop from the opening. A purse-string suture was placed on the jejunum about 10 cm distal from the cut end and its center was cut open. The distal end of the Y-tube was pulled out from the opening. The distal cut end of the choledochus was pulled ventral and cephalad with a grasper; the inferior surface of the liver was pushed cephalad, thereby exposing the hepatic hilum. The posterior wall of the hepatic duct at the hilum was cut for a semicircle, and was approximated with the posterior wall of the jejunal opening with transmural interrupted sutures (five stitches).

We tried to place the Y-tube into the intrahepatic bile ducts, but could not adequately place it into the right hepatic duct. So we cut the right branch of the Y-tube and placed the tube only in the left hepatic duct. The anterior wall of the hepatic duct was cut and the choledochal cyst was taken out. However, after removal of the cyst, we could not get adequate pressure on the inferior surface of the liver. This resulted in falling of the hepatic duct dorsally, which made suturing of the anterior wall of the hepatic duct virtually impossible.

We decided for conversion. Laparotomy was done with a right subcostal incision. The anterior walls of the hepatic duct and the jejunum were approximated with transmural interrupted sutures (five stitches). Thus the hepaticojejunostomy roux-en-Y at the hepatic hilum (the anastomosis below) was accomplished. Two stay sutures were put at the liver capsule and three milliliters of synthetic fibrin glue was sprayed at the anastomosis. The end of the Y-tube was externalized from the right lateral upper abdomen. The purse-string suture was tied and the jejunal loop was fixed to the abdominal wall. Two penrose drains were placed eith their tips posterior to the anastomosis. The abdomen was closed layer-to-layer to finish the operation. The total opera-

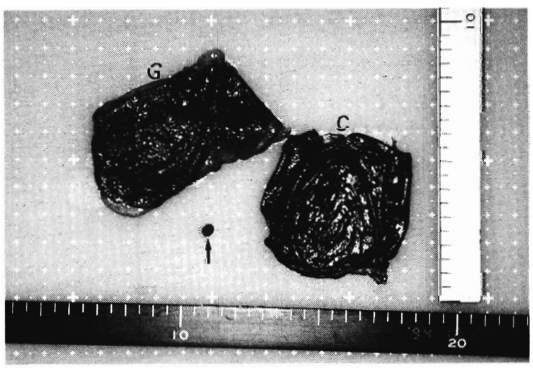

Fig. 4 Macroscopic view of the resected specimen
Gallbladder with multiple small cholesterol polyps (G), a small polyp in the gallbladder (⬇) and dilated common bile duct (C) were seen. Macroscopic findings of the mucosa were not suggestive of malignancy.

tive time was nine hours and 37 minutes. The amylase level in the choledochal cyst was 234, 600 IU/l, carcinoembryonic antigen was 1.1 ng/ml.

Sample: The mucosal surface of the gallbladder was filled with small cholesterol polyps, and a polyp floated in the gallbladder bile. there were no findings suggestive of cancer (Fig. 4).

Histological findings: The mucosal structure of the gallbladder was intact at the fundus. Degeneration was observed in the body, and it gradually became stronger nearing the bladder neck. The mucosa of the choledochal cyst had fallen and the wall comprised thick connective tissue (Fig. 5). The polyps in the gallbladder comprised foamy cells. They were cholesterol polyps histologically as well as macroscopically.

Postoperative course: The patient recovered uneventfully. She reported flatus on the second postoperative day (POD). Fluid meals were started on the 8 POD. A Y-tube cholangiography on the 14 POD showed good anastomotic passage without leak (Fig. 6A). The Y-tube was removed on the 15 POD. She was discharged on the 19 POD. Ultrasonography and CT taken on January 21, 1995, (85 POD) showed no intrahepatic duct dilatation. CBC and blood chemistry data including so-called bile duct enzymes were within normal limits. Bile duct scintigraphy with ^{99m}Tc on February 8 (103 PDO) showed good bile outflow and no anastomotic stenosis (Fig. 6B).

Discussion

Biliary tree dilatation may or may not accompany anomalous arrangement of the cholangiopancreatic ducts (the anomalous

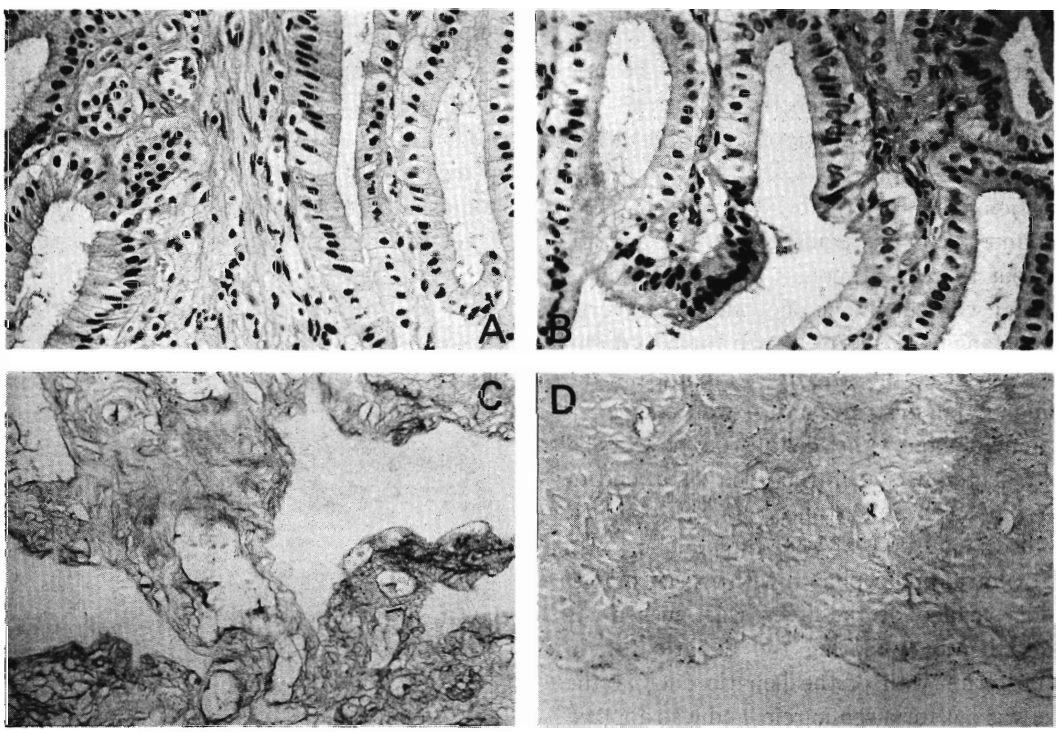

Fig. 5 Histological findings of the gallbladder and dilated common bile duct (H.E., ×400)
Mucosal degeneration progresses from A to C. Wall of the dilated common bile duct was composed of thick connective tissue.
A: Fundus of the gallbladder, B: Body of the gallbladder, C: Neck of the gallbladder, D: Wall of the dilated common bile duct.

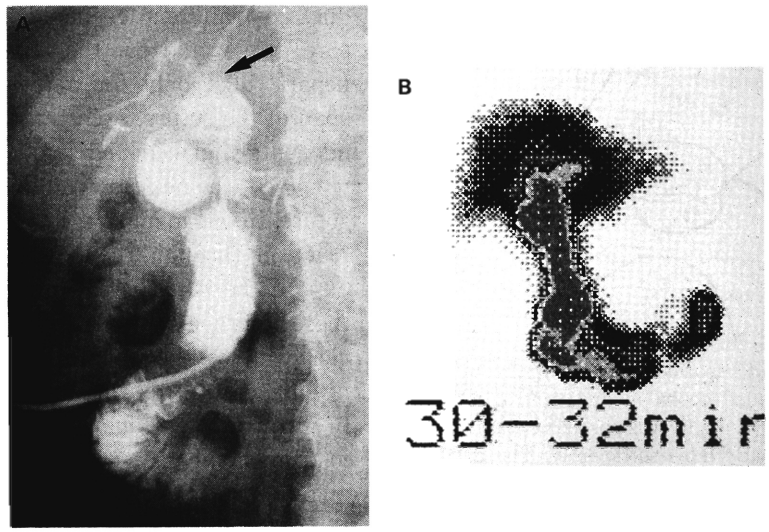

Fig. 6 (A) Cholangiogram through Y-tube (14th POD)
Arrow indicates the site of roux-en-Y hepaticojunostomy with no evidnce of leak or stenosis.
(B) ^{99m}Tc scintiscan showed smooth bile outflow (103rd POD).

arrangement, below). On the other hand, the anomalous arrangement usually accompanies so-called choledochal cyst[2]. Dilatation of the extrahepatic biliary duct is classified into three types, cystic, columnar (fusiform), and diverticular[3]. In 1991, Komi[1] classified the anomalous arrangement into three types, according to the mode of confluence. In Type I, the narrow segment of the distal choledochus merges with the pancreatic duct at almost right angle (so-called bile duct type). In Type II, the choledochus and the pancreatic duct meet at an acute angle (so-called pancreatic type). Type III is associated with the incomplete fusion of the pancreatic ducts. Each type is subclassified into subtypes. In 1987, Aoki et al. reported that the anomalous arangement was found in 3.3% (414/12,399 cases) of cases receiving biliary duct operation. Among these, according to the mode of confluence, the bile duct type amounts to 47.8%. Looking from the form of dilatation, cystic type accounts for 44.5%. Cystic bile duct type accounts for 35.2%. Bile duct carcinoma often accompanies the anomalous arrangement. Cholangiocarcinoma is found more often in cystic type, and gallbladder carcinoma in columnar (fusiform) type. In bile duct type cystic dilatation, the incidence of cholangiocarcinoma was 7.3% (14/192 cases), and that of gallbladder carcinoma 4.2% (8/192 cases)[4].

The aim of radical operation for congenital biliary dilatation is division of the biliary tree from the pancreatic duct and resection of the dilated biliary tree from which carcinoma is likely to occur. The dilated common bile duct is cut near the confluence of the pancreatic duct. The common bile duct or hepatic ducts are cut at the hepatic hilum. The reconstruction is usually hepaticojejunostomy roux-en-Y at the hepatic hilum according to the literature. The proximal bile duct should be free from dilatation or stenosis. Anastomosis should be large enough lest postoperative stenosis occur[5]. For cases such as ours, where there is no intrahepatic duct dilatation and no complication of bile duct carcinoma, laparoscopic operation, if possible at all, seems very good in that it gives lesser postoperative pain, better cosmesis, early return to work, etc.

As this case was our first laparoscopy-

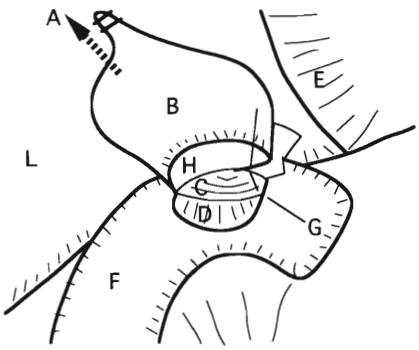

Fig. 7 Schema of hepatico-jejunostomy
The cyst is pulled cephalad and ventral. The inferior surface of the liver is pushed cephalad to expose the hepatic hilus sufficiently. The anterior wall of th cyst is cut as far as the next suture.
A: Direction of traction, B: Choledochal cyst, C: Posterior wall of the hepatic duct, D: jejunal mucosa, E: lig. falciforme, F: jejunum, G: suture, H: Anterior wall of the cyst, L: Inferior surface of the liver.

assisted operation, and we watched the postoperative course very carefully, the patient started meals on the eighth POD. However, as peristalsis and flatus were observed on the second POD, we think meals could be given on the third of fourth POD. Had we performed Y-tube cholangiography on the seventh POD with good results, she could have been discharged around the tenth POD.

We needed subcostal incision (conversion to open laparotomy) because the hepatic duct fell dorsally after the choledochal cyst was removed. To prevent this, we might have inserted another trocar (between trocar A and trocar B in Figure 7) and used a retractor to push the inferior surface of the liver cephalad to get a better exposure of the hepatic hilum. Or we might not cut the hepatic duct even after the posterior wall of hepaticojejunostomy had been sutured. Then we could pull the common bile duct ventrally and cephalad for a better exposure. We would cut the anterior wall of the hepatic duct only for a few millimeters, the span of the suture, each time. After a suture is adequately placed and knots are secured, we would cut the next few millimeters for the next suture. In this manner, we could exert sufficient traction through the common bile duct to expose the hepatic hilum. (See Fig. 7). With these improvements, the suturing of the anterior wall of the hepaticojejunostomy would become easire. we can expect further expertise in intracorporeal ligation or improvements of instruments, e.g., a needle holder that permits angulation of the tip or that permits modulation of the angle to hold a needle. So in the near future, we think all the operative procedures including hepaticojejunostomy could be accomplished under laparoscopy and in shorter time.

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腹腔鏡併用下手術を行った先天性胆道拡張症の1例

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先天性胆道拡張症は胆道癌を発生することが多く，早期に胆道と膵管の分離および拡張部胆道の摘除手術が必要とされている．腹腔鏡下手術は開腹手術に比べ数々の長所を有し，胆嚢摘出術以外の各種の疾患に対しても行われるようになっている．我々は58歳の女性で，嚢腫型の肝外胆管拡張（4×3 cm）に古味の III_{c2} 型膵胆管合流異常を伴う症例に対し，腹腔鏡介助下手術（嚢腫切除・結腸前経路肝管空腸 Roux-en-Y 吻合）を行った．術野が不十分であったため，前壁側の肝管空腸吻合は右肋骨弓下切開を追加して完了した．切除標本に胆道癌は認めなかった．術後103日目の ^{99m}Tc による胆道シンチグラフィーでは，胆汁の流出は良好で吻合部狭窄も認められなかった．1995年6月現在，総胆管嚢腫に対して腹腔鏡介助下手術を行った症例は報告されていない．肝圧排鉗子の効果的使用，嚢腫切離を胆管空腸吻合終了まで行わない，など肝下面の頭側への圧排方法の工夫により，肝管空腸吻合を含むすべての手術操作を腹腔鏡下で行うことが可能と思われるので報告する．