Laparoscopic cholecystostomy and bile duct lavage for treatment of inspissated bile syndrome: a single-center experience

Zhi-Gang Gao, Min Shao, Qi-Xing Xiong, Jin-Fa Tou, Wei-Guang Liu
Hangzhou, China

Background: **We aim to describe our experience of laparoscopic cholecystostomy and bile duct lavage in the treatment of inspissated bile syndrome.**

Methods: **Between January 2005 and December 2009, 16 infants with inspissated bile syndrome underwent laparoscopic cholecystostomy and bile duct lavage in our department. They were 7 males and 9 females, aged 40 days to 3 months, with an average of 65±23.4 days. A laparoscopic aided cholecystostomy was done. Cholangiography and bile duct lavage were performed during the operation. One week after the operation, bile duct lavage with saline was repeated every 2 to 3 days. According to bilirubin levels and liver function, the tube was kept for 2-4 weeks.**

Results: **The level of bilirubin decreased and liver function was greatly improved after bile duct lavage. Direct bilirubin level, aspartate aminotransferase and γ-GT were significantly decreased 1-2 months after the operation compared with those before surgery (P<0.05).**

Conclusions: **The treatment strategy for inspissated bile syndrome with laparoscopic cholecystostomy and biliary duct lavage is feasible and effective.**

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Key words: **bile duct lavage;**
inspissated bile syndrome;
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Author Affiliations: Department of Pediatric Surgery, Children's Hospital, Zhejiang University School of Medicine, 57 Zhugan Xiang, Hangzhou 310003, China (Gao ZG, Shao M, Xiong QX, Tou JF, Liu WG)

Corresponding Author: Wei-Guang Liu, Children's Hospital, Zhejiang University School of Medicine, 57 Zhugan Xiang, Hangzhou 310003, China (Tel: 86-571-87061007; Fax: +86-571-87033296; Email: ebwk@zju.edu.cn)

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Introduction

Inspissated bile syndrome is defined as partial or complete obstruction of the extrahepatic biliary system by impaction of thick bile or sludge in the distal common bile duct during the neonatal period.[1] Herein, we report our experience of laparoscopic cholecystostomy and bile duct lavage in the treatment of inspissated bile syndrome.

Methods

Between January 2005 and December 2009, 58 patients with infantile conjugated jaundice underwent laparoscopic exploration at our hospital. After laparoscopic exploration, 42 patients were diagnosed with biliary atresia and turned to the Kassai procedure. Sixteen patients were diagnosed with inspissated bile syndrome by cholangiography showing well-developed intra- and extrahepatic biliary tract with the expansion of the common bile duct.

The 16 patients included 7 boys and 9 girls, aged 40 days to 3 months, with an average of 65±23.4 days. Their clinical manifestations were progressing jaundice which started from 12 days (range: 8-26 days) after birth, dark urine, pale stool, and hepatomegaly. Biochemistry test showed total bilirubin of 150-250 μmol/L, mainly by increased conjugated bilirubin. Levels of aspartate aminotransferase (AST) and Gln-transferase (ALT) significantly increased. γ-GT and alkaline phosphatase increased in varying degrees. Ultrasound examination found varying degrees of liver enlargement and normal sized gallbladder. Four patients were associated with ABO incompatibility and 9 preterm infants received total parenteral nutrition therapy. All patients had received conservative treatment with ursodeoxycholic acid (Ursofalk, Losan Pharma GmbH, Germany, 10 mg/kg), ademetionine 1, 4-butanedisulfonate (Transmetil, Abbott S.R.L, Italy, 60 mg/kg) and traditional Chinese medicine. However, the level of conjugated bilirubin did not decrease or even increased, hence we resorted to the

laparoscopic biliary tract exploratory procedure. Under general anesthesia, pneumoperitoneum was achieved in the periumbilical location using CO_2 under 10 mmHg pressure. Three trocars were used, one at the umbilicus for the camera, and the other two at the right and left midabdomen (midclavicular line) as working ports. Then the hepatic portal and gallbladder can be detected. With a laparoscopic blunt grasper, the tip of the gallblader was pulled out through the abdominal wall at the trocar site to perform a cholecystostomy. An intravenous cannula needle was inserted into the bottom of the gallblader and 38% meglumine diatrizoate was infused for cholangiography (Fig.). Then the fundus of the gallbladder was opened and a catheter was inserted and sutured to the abdominal skin. We lavaged the bile duct for the first time with warm saline (20-40 mL, 3 mL/s) during the operation. Then we lavaged once every 2 to 3 days one week after the surgery according to the bilirubin levels and drainage of the bile. The catheter was kept for about 2-4 weeks.

This study was approved by the Ethical Committee of the Children's Hospital, Zhejiang University School of Medicine. Informed consent was obtained from the parents of the patients before the procedure. Statistical analysis was performed using SPSS15.0 for Windows. The indicators before and after the operation were used to compare paired samples by Student's *t* test.

Results

In all 16 patients, the gallbladder was found to be distended, and the liver was large with a green-brown discoloration during laparoscopy. Cholangiography at the time of operation showed contrast in the intrahepatic and the common bile duct with a flow of the contrast to the duodenum. The expansion of the common bile duct can be noted (Fig.). Then, inspissated bile syndrome was dignosed. One week after surgery, direct bilirubin (DBIL) decreased slightly in 9 patients, increased in 3, and unchanged in 4. Two weeks after surgery, DBIL was significantly decreased in 8 patients, decreased slightly in 5, unchanged in 2, but increased in 1. One month after surgery, DBIL was significantly decreased in 14 and slightly decreased in 2. Two months after surgery, DBIL was significantly decreased in all the patients ($P<0.001$) and γ-GT was significantly decreased ($P=0.0007$). AST was significantly decreased at 2 months after surgery ($P=0.0027$) (Table). No complications were observed during or after the laparoscopic surgery. According to the color of stool and the level of bilirubin we stopped the bile duct lavage. Postoperative follow-up of liver function and ultrasound for 12 months to 5 years showed that all the 16 patients recovered well with no recurrence.

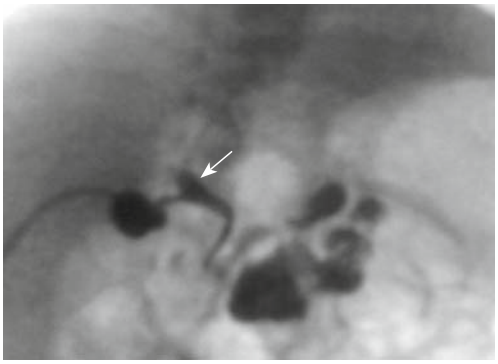

Fig. At the time of operation, cholangiography showing contrast in the intrahepatic and the common bile duct with flow of the contrast to the duodenum. Arrow shows the expansion of bile duct.

Discussion

Inspissated bile syndrome is one of the etiological factors leading to neonatal and infantile obstructive jaundice. Initially, it may be difficult to differentiate from biliary atresia because both are characterized by conjugated jaundice and acholic stools. If the bile can not be discharged smoothly for a long time, severe cholestasis can increase liver damage and even lead to biliary cirrhosis.

Cholestatic disease still remains a major diagnostic and therapeutic challenge.[2] A number of diagnostic and therapeutic methods for inspissated bile syndrome have been studied. Magnetic resonance cholangiopancreatography (MRCP)[3,4] and endoscopic retrograde cholangiopancreatography (ERCP)[5,6] have been used in the diagnosis of obstructive jaundice, but they are clinically difficult to carry out for the treatment of inspissated bile syndrome.

Operative cholangiogram (OCG) is used for a definitive diagnosis of cholestatic jaundice in infants. But exploratory laparotomy has relatively high invasiveness and postoperative complications.[7]

Ultrasound-guided percutaneous cholecysto-

Table. Postoperative outcome of the 16 patients with inspissated bile syndrome

Time	DBIL (μmol/L)	γ-GT (U/L)	AST (U/L)
Before surgery	142±76	195±110	122±120
1 wk after surgery	124±50	173±88	95±50
2 wk after surgery	100±71	157±165	90±60
1 mon after surgery	59±45* ($P=0.001$)	153±220	61±33
2 mon after surgery	29±19* ($P<0.0001$)	75±50* ($P=0.0007$)	48±13* ($P=0.0027$)

*: Compared with the preoperative indicators, the difference was statistically significant. DBIL: direct bilirubin; AST: aspartate aminotransferase.

cholangiography (PCC)[8] and percutaneous transhepatic cholangiography (PTTC)[9] with contemporary therapeutic saline lavage of the biliary tree could avoid unnecessary laparotomy, but they are difficult procedures for infants. Moreover, it is sometimes difficult to obtain a sufficient flushing pressure.

Laparoscopic surgery procedure has a rapid postoperative recovery and fewer wound complications.[10] The liver and gallbladder can be inspected by direct vision. The use of laparoscopic techniques and cholangiography is conducive to an early diagnosis in patients with obstructive jaundice. It is an alternative treatment that can be recommended for children with inspissated bile syndrome when conservative therapy is unsuccessful.[11] Laparoscopic cholecystostomy and bile duct lavage can avoid surgical exploration. After cholecystostomy, repeated bile duct lavage can be taken according to bilirubin levels and liver function of the patients so as to relieve the jaundice more quickly.

The performance of laparoscopic cholecystostomy and bile duct lavage should emphasize the following points: 1) For the position of the right midabdomen trocar, the surgeon presses with finger on the abdominal wall under direct vision and takes the closest location of the gallbladder as a puncture point. 2) If the gallbladder is not convenient to pull out, electric hook-sharpening should be used to separate the serosa of the gallbladder bed. 3) The catheter should be carefully sewed to avoid the leak of contrast media into the abdominal cavity, then suture the serosa of the gallballder to the abdominal wall.

In conclusion, the treatment strategy for inspissated bile syndrome with laparoscopic cholecystostomy and biliary duct lavage is feasible and effective.

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Competing interest: All authors do not have commercial or other association that might pose a conflict of interest.

Contributors: Gao ZG wrote the first draft of this paper. All authors contributed to the intellectual content and approved the final version. Liu WG is the guarantor.

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