Endoscopic Clip Closure of Duodenal Perforation Caused by Percutaneous Drainage Procedure

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Acute cholecystitis is a disease commonly treated in health care institutions. Cholecystectomy is the standard treatment for acute cholecystitis, and emergent laparoscopic cholecystectomy is acceptable as an effective and safe treatment modality. One of the complications after laparoscopic cholecystectomy is intra-abdominal abscess. The standard treatment for postoperative intra-abdominal abscess is percutaneous transhepatic drainage and use of antibiotics. However, duodenal perforation can occur during insertion of the pigtail catheter for drainage. Operation is the treatment of choice for iatrogenic duodenal perforations. Recent reports describe nonsurgical treatments for small gastrointestinal perforation with localized peritonitis and suggest that endoclipping may be appropriate in the management of a well selected group of patients with iatrogenic perforation. We describe a case of duodenal perforation due to pigtail catheter insertion for percutaneous transhepatic drainage that was successfully treated by using endoclips.

Key Words: Duodenal perforation; Endoclipping; Cholecystectomy; Abscess

INTRODUCTION

Acute cholecystitis is one of the most common diseases among patients who visit hospitals for pain in the right upper quadrant (RUQ). Treatment of choice for acute cholecystitis is cholecystectomy. Due to its high success rate and low complication rate, laparoscopic cholecystectomy has become the customary treatment for the disease. However, the procedure is deemed to be inappropriate for elderly people, patients with severe sepsis, or those who are at high risk for a general anesthesia due to their underlying diseases. For these patients, percutaneous trans-hepatic gallbladder drainage is performed as a non operative treatment, followed by a long-term antibiotic treatment.

The main postoperative complications of the laparoscopic cholecystectomy are bile duct injury, bile leakage, peritoneal adhesion, postoperative infection, etc. Intra-abdominal abscess can also occur after the operation, which requires insertion of drainage tube through percutaneous drainage procedure followed by antibiotic treatment. Complications of percutaneous drainage have also been reported. Among them, late postoperative complications of percutaneous drainage include injury of pancreas and bile duct, perforation of gastrointestinal tract.

A 65-year-old man had been diagnosed with acute cholecystitis at our hospital and underwent laparoscopic cholecystectomy. However, since an abscess developed in the surgical site as a postoperative complication, the percutaneous drainage was performed for the treatment of the complication. This study intends to report the case because the drainage tube inserted during the percutaneous drainage procedure produced a duodenal perforation in the patient, which was treated with an endoscopic clipping.

CASE REPORT

A 65-year-old man with a medical history for diabetes visited a local clinic for abdominal pain and nausea that had been started four days before his visit to the hospital. Oral medication was prescribed since acute cholecystitis was suspected from the abdominal ultrasonography at the clinic (Fig. 1). However, he went to other hospital because of worsened symptoms after a day and received an
abdomen CT scan which revealed acute cholecystitis. He was then transferred to our hospital for a surgical treatment.

The patient rarely drank alcohol but had smoked for 25 years. The patient’s vital signs on the visit to our hospital were as follows: blood pressure 140/90 mmHg; heart rate 99 bpm; respiratory rate 20 bpm; body temperature 36.8°C; peripheral blood oxygen saturation 96%; and peripheral blood glucose level 163 mg/dL, etc. The patient answered that he had nausea and compressed pain in RUQ when he was palpated. His bowel sound was relatively normal and his abdominal wall was smooth with no costovertebral angle tenderness. Results from his blood test taken at our hospital were as follows: hemoglobin 15.0 g/dL, a white blood cell count 22,400/μL with 85.1% neutrophil, a platelet count of 191,000/μL, serum CRP 280.03 mg/dL, BUN 21.0 mg/dL, creatinine 1.1 mg/dL, albumin 3.5 g/dL, total bilirubin 1.33 mg/dL, AST 35 IU/L, ALT 51 IU/L, LDH 203 IU/L, serum ammonia 11 μmol/L, serum amylase 29 U/L, serum lipase 76 U/L checked.

The patient underwent the laparoscopic cholecystectomy and percutaneous trans-hepatic gallbladder drainage on the day he was admitted to the surgery department.

Fig. 1. Abdomen ultrasonography finding. Presence of thickening of the gallbladder wall is examined, suggesting possibility of acute cholecystitis.

Fig. 2. Abdominal CT finding. An intra-abdominal abscess is seen around the surgical site on the 15th day after the laparoscopic cholecystectomy.

Fig. 3. Intra-abdominal percutaneous drainage. (A) A needle is getting into the abscess. (B) A guide wire is being inserted through a needle. (C) A pigtail catheter is being inserted through a guide wire.
However, on the 15th day after the operation, an abscess developed in the area surrounding the surgical site (Fig. 2). After, he eventually had to receive percutaneous drainage for abscess (Fig. 3). On the 28th day after the operation, he was transferred to the division of gastroenterology because the drainage turned yellow, suggesting possibility for biliary leakage. Thus, endoscopic retrograde cholangiopancreatography (ERCP) was performed for confirming the biliary leakage. When a contrast medium was injected after a catheter was inserted through an ampulla, a 1 cm of common duct was seen and p-duct and C-duct were contrasted. A thin duct which branched outside of the common bile duct between middle and distal common bile duct to outer common bile duct was examined but whether it was a long cystic duct or accessory intrahepatic duct was not clear. Expansion of proximal common bile duct and intra-hepatic duct were not seen and bile leakage was not found in main common bile duct tree also. The procedure was finished after 5 Fr endoscopic nasobiliary drainage was inserted to left intrahepatic duct (Fig. 4).

On the 53th day after the operation, the patient complained of mild pain in the area where percutaneous drainage had been inserted. He continuously compressed pain in the area afterward.

In order to find out the cause of the pain, a cholangiography was performed on the 65th day after the initial operation. The cholangiography showed contrast spreading into the duodenum, while biliary tract was not contrasted (Fig. 5). Because complained of the pain constantly, upper gastrointestinal endoscopy was conducted to look at the duodenum surrounding the area. The end of catheter inserted during percutaneous drainage was seen in the second part of duodenum. A duodenal perforation by the tip of drainage tube was confirmed. The perforated site was local with no evidence of inflammation around the area. On the day of the examination, there were no symptoms of peritonitis such as abdominal rigidity or fever. The blood test results were normal and an abdominal radiography showed no traces of pneumoperitonium. Drainage was removed immediately and the endoscopic closure was performed, by using four endoclips.

After the procedure, the patient didn’t complain of abdominal pain any longer. Inflammation level from the blood test taken as part of tracking observation was not increased and the radiographic images of the abdomen seemed normal as well. The patient no longer complained of the pain in the area where drainage was inserted. Abdominal CT scan also showed no abscess anymore.

Fig. 4. Endoscopic retrograde cholangiopancreatography. When contrast medium was injected after a catheter was inserted through an ampulla, a 1 cm of common duct was seen and pancreatic duct and common bile duct were contrasted. Fistula is not detected in operative site.

Fig. 5. Cholangiography finding. Contrast medium is spreading into the duodenum.
After a week, an endoscope was used to monitor the patient’s condition; all clips had been fallen away and a scar change of the perforation site was noted: no particular condition except a scar was found (Fig. 6); and etc. The patient discharged the hospital and has been during follow up as an outpatient.

**DISCUSSION**

Acute pain in the RUQ is mostly caused by diseases related to liver, biliary tract, pancreas such as acute cholecystitis, acute cholangitis, liver abscess and acute pancreatitis. Other diseases that may cause pain in the RUQ include gastrointestinal diseases such as perforation due to peptic ulcer, ischemic colitis, Crohn’s disease, respiratory diseases such as right lower lobe pneumonia, pulmonary embolism, and inflammations such as herpes zoster. Acute cholecystitis is reported to be the most common cause of the pain.1,2 Majority of cases of acute cholecystitis are caused by gallstones. These days ultrasonography for health screening has found increasing number of asymptomatic gallstones, increasing the proportion of asymptomatic gallstones in the number of total cholelithiasis. Prevalence of cholelithiasis varies greatly by race and country. In Korea, 3.1% of men and 3.4% of women among 5,126 people who had health checkup in 1997 had asymptomatic gallstones. Gallstones can be as small as a grain of sand or as big as a golf ball. Gallstones can be divided into three types, as pigment stones, cholesterol stones and mixed stones. About the cause of acute cholecystitis, cholesterol stones are common in western people, on the other hand pigment stones hold a large majority in Korea. However, western changes in lifestyle of Koreans increased the proportion of cholesterol stones.13,14 Patients with cholecystitis without gallstones are rarely reported among debilitated patients such as long-stay patients in intensive care unit, patients with severe diabetes or those who had an operation in area other than biliary tract.15

When a patient is diagnosed with acute cholecystitis, laparoscopic cholecystectomy is the customary treatment for the disease. Mortality rate and complications rate of
laparoscopic cholecystectomy range between 0.2∼1.19% and 5.3% respectively. It is reported to have lower complication rate than open cholecystectomy and is considered a safe procedure that facilitates more fast recovery and discharge from the hospital.3-5,16

However, the laparoscopic cholecystectomy can cause major complications such as, bile duct injury, bile leakage, gastrointestinal tract and blood vessel injury, peritoneal adhesion, postoperative infection, etc. Intra-abdominal abscess can also occur as a postoperative infection. If it is a single abscess, percutaneous abscess drainage needs to be performed in the place of abscess followed by antibiotic treatment.17

The drainage tube inserted during percutaneous drainage procedure may cause complications. Initial complications include breakaway, blockage and convolution of drainage tube. Late complications include injury of pancreatic-biliary system and intestinal perforation, etc. It was reported that the size of drainage tube may play important role in causing complications.8-12

Duodenal perforation is usually caused by duodenal ulcer. Meanwhile, iatrogenic perforations of duodenum may occur by the improper handling of distal end of endoscope, ERCP, mucosectomy device, or during insertion of the drainage tube.

Surgical treatment has been considered as the first choice of therapy for duodenal perforation because endoscopic procedure for duodenal perforation caused by duodenal ulcer produced less than satisfactory results and lower natural recovery power of the perforated area due to chronic inflammation in the area. However, endoscopic suturing method using clips is preferred nowadays because iatrogenic perforations in example caused by an endoscope can be detected relatively early. Since the endoscopic clips were first used for the treatment of iatrogenic gastric perforation in 1993,18 there have been many reports of successful use of endoscopic clips for the treatment of gastric perforation. However there is no treatment guideline for endoscopic closing for the gastrointestinal perforation yet.

In this case, endoscopic clip-knot suturing technique was selected as the primary method. When it is failed due to the site of a perforation which is laterally located, however, band ligation method reported by Li et al.19 can also be considered. As an alternative way, over-the-scope clip (Ovesco, Tübingen, Germany), which was presented by Kirschniak et al.20 in 2007 for the treatment of small mural defects and bleeding ulcers, can be applied. However, there seems to be a limitation to apply the over-the-scope clip technique for this purpose in that the perforation or fistula should be small enough for the cap of endoscopic tip to be pulled into. Considering that this has not been commonly applied in domestic yet, furthermore, it seems to be hard for practitioners to be mastered.

We experienced the case of successful endoscopic closure of duodenal perforation caused by percutaneous drainage. Early diagnosis is the most important step in the treatment of duodenal perforation which should be followed by proper treatment.

As shown in this case, therefore, if a patient who had percutaneous drainage continuously shows the sign of peritoneal irritation, an iatrogenic duodenal perforation should be considered as a cause of pain. Endoscopic clip closure needs to be considered in advance to an operation if upper gastrointestinal endoscopy confirms the duodenal perforation. This is because the endoscopic procedure may reduce the risk of postoperative complications and facilitate faster recovery.

REFERENCES