

Endoscopic transpapillary gallbladder drainage (ETGBD) for the treatment of acute cholecystitis

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Abstract: We performed endoscopic transpapillary gallbladder drainage (ETGBD) in 21 patients with acute cholecystitis, utilizing a guidewire coated with a hydrophilic polymer. Endoscopic sphincterotomy was not performed. The clinical efficacy of ETGBD was evaluated in terms of reduction of white blood cell count (WBC) and C-reactive protein (CRP) level. ETGBD was successful in 17 (81%) of the 21 patients, in terms of early disappearance of clinical symptoms, and significant decrease of both WBC and CRP after ETGBD ($P < 0.001$). In patients with the Mirizzi syndrome ($n = 2$), accurate diagnosis was made by endoscopic retrograde cholangiography (ERC), facilitating proper drainage (ETGBD) immediately afterward. With ETGBD, emergency operation was avoided even in critically ill patients complicated with disseminated intravascular coagulopathy ($n = 2$). There were no significant complications. ETGBD may be an effective and safe alternative to percutaneous transhepatic gallbladder drainage in the management of acute cholecystitis, and may be more suitable for patients with a strong bleeding tendency.

Key words: acute cholecystitis, ETGBD, Mirizzi syndrome, DIC

Introduction

The endoscopic transpapillary maneuver, developed several years after the introduction of endoscopic retrograde cholangiopancreatography (ERCP),^{1,2} is now indispensable for patients with acute cholangitis as emergency biliary drainage. However, the maneuver is not used for acute cholecystitis because of the spiral structure of the cystic duct, and it has been assumed that the method is not suitable for gallbladder drainage. In approximately 95% of patients with acute cholecystitis,

a stone is impacted in the neck of the gallbladder or the cystic duct close to the outlet of the gallbladder, and intravenous antibiotics have a limited effect in these patients.³ Furthermore, severe complications, such as bile peritonitis, bacteremia, and disseminated intravascular coagulopathy (DIC) can develop despite the intravenous injection of antibiotics. In this regard, it may be necessary to perform cholecystotomy to decompress the gallbladder and to reduce the inflammation.

In 1984, Kozarek⁴ succeeded in performing selective cannulation of the cystic duct during ERCP and reported it as a new method for the scrutiny of gallbladder lesions. This achievement was followed by that of Foerster et al.⁵ who performed endoscopic retrograde catheterization of the gallbladder (ERCG) in ten autopsy cases in 1988. The transpapillary approach to gallbladder diseases has now been reported in the literature for use in the double-contrast method in the gallbladder,⁶ for the direct dissolution of gallstones⁷⁻⁹, for gallbladder drainage,¹⁰⁻¹⁴ and for intra-gallbladder sonography.¹⁵ The transpapillary approach is less invasive and safer than the percutaneous transhepatic approach. The development of a suitable new guidewire has now made it feasible to perform endoscopic transpapillary gallbladder drainage (ETGBD). We describe herein the usefulness and the efficacy of this less invasive procedure, ETGBD, performed without endoscopic sphincterotomy (EST) in patients with acute cholecystitis. We assessed the outcome in these patients by comparing the white blood cell count (WBC) and C-reactive protein (CRP) levels before and after the performance of ETGBD.

Materials and methods

Patients

Twenty-one patients (6 men and 15 women) with acute cholecystitis, confirmed by clinical characteristics, com-

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plete blood cell counts, and biochemical and ultrasound findings, were included in this study. The patients were aged 66 ± 11 (mean \pm SD) years (range, 26–83 years). All patients had fever, right upper quadrant pain, and a sonographically detected distended gallbladder with a thickened wall. Seventeen patients had stones in the gallbladder. Two patients developed the Mirizzi syndrome and another 2 had complications of DIC. Informed consent for the procedure was obtained from each patient.

ETGBD technique

Endoscopic retrograde cholangiography (ERC) was performed, and a catheter with a radiopaque tip was inserted deep into the common bile duct in proximity to the opening of the cystic duct. The Radifocus guidewire (Terumo, Tokyo, Japan) was 0.025–0.035 inches in diameter with a soft tip 3 cm in length. The tip was angulated and could be inserted through the stylet port of the catheter. The tip was introduced into the gallbladder, and then the catheter was inserted over the guidewire up to the fundus of the gallbladder. Using a stiff guidewire, we replaced the catheter with a 5- or 7.2-Fr pigtail tube that had five side holes distributed over the distal 5 cm. Finally, the tube was brought out through the nasal cavity via a gastric tube, and was fixed to the skin. After the aspiration of as much infected bile juice as possible, 100–200 mg of antibiotic (amikacin sulfate) was injected. In the light of our previous findings, we considered it unnecessary to perform EST before endoscopic biliary drainage;¹⁶ accordingly, ETGBD was done without EST in all but one patient, who had both common bile duct and gallbladder stones.

Results

Success rate of gallbladder catheterization and efficacy

ETGBD was successfully performed in 17 of the 21 patients (81%), the drainage being successful even in the 2 patients with the Mirizzi syndrome. The average volume of infected bile aspirated was 85.6 ± 32.3 ml (range, 50–180 ml). The catheter was left in the gallbladder as continuous drainage for a maximum period of 20 days. All patients were free of right upper quadrant pain as soon as the infected bile was aspirated, and all became afebrile within 3 days. Both WBC and CRP decreased significantly ($P < 0.001$) 1–7 days after ETGBD (Fig. 1). In 4 of the 17 patients for whom ETGBD was successful, cholecystitis was treated only by aspiration of bile under duodenoscopy, without placement of a drainage catheter.

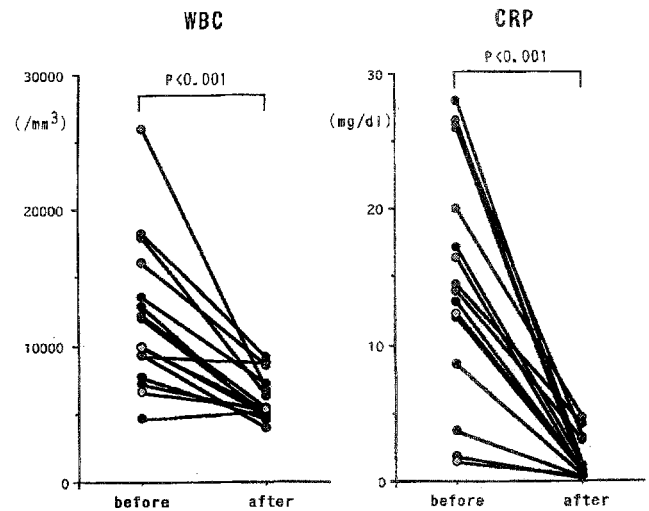


Fig. 1. Changes in white blood cell (WBC) and C-reactive protein (CRP) levels in patients with acute cholecystitis before and after endoscopic transpapillary gallbladder drainage ETGBD

Complications

Seventy-one percent of the patients had right upper quadrant pain during catheterization. This pain disappeared immediately after the aspiration of bile. There were no severe complications such as pancreatitis or perforation.

Follow-up

Of the 17 patients in whom ETGBD was successful, 13 were referred for surgery. Within 2–4 weeks, 8 patients had a laparoscopic cholecystectomy and 5 had an open cholecystectomy. Of the remaining 4 patients, 1 died of acute myocardial infarction (unrelated to ETGBD) after 1 year. The remaining 3 patients showed no recurrence of cholecystitis for 3–39 months of follow-up. Percutaneous transhepatic gallbladder drainage (PTGBD) was done in the four patients for whom ETGBD failed.

Case 1. A 26-year-old woman presenting with fever and right upper quadrant pain was referred to our unit. She was diagnosed with acute cholecystitis by physical examination, laboratory findings, abdominal ultrasound, and computed tomography (CT) scan. ERC revealed a normal bile duct and a stone impacted in the gallbladder neck (Fig. 2a). Following ERC, ETGBD was performed without EST (Fig. 2b,c), and a 5-Fr catheter was placed in the gallbladder. The pain was relieved as soon as 70 ml of the infected bile was drained, and the patient was afebrile the next day. Seven days after the ETGBD, cholecystography, via the drainage catheter, showed an oval-shaped stone obstructing the

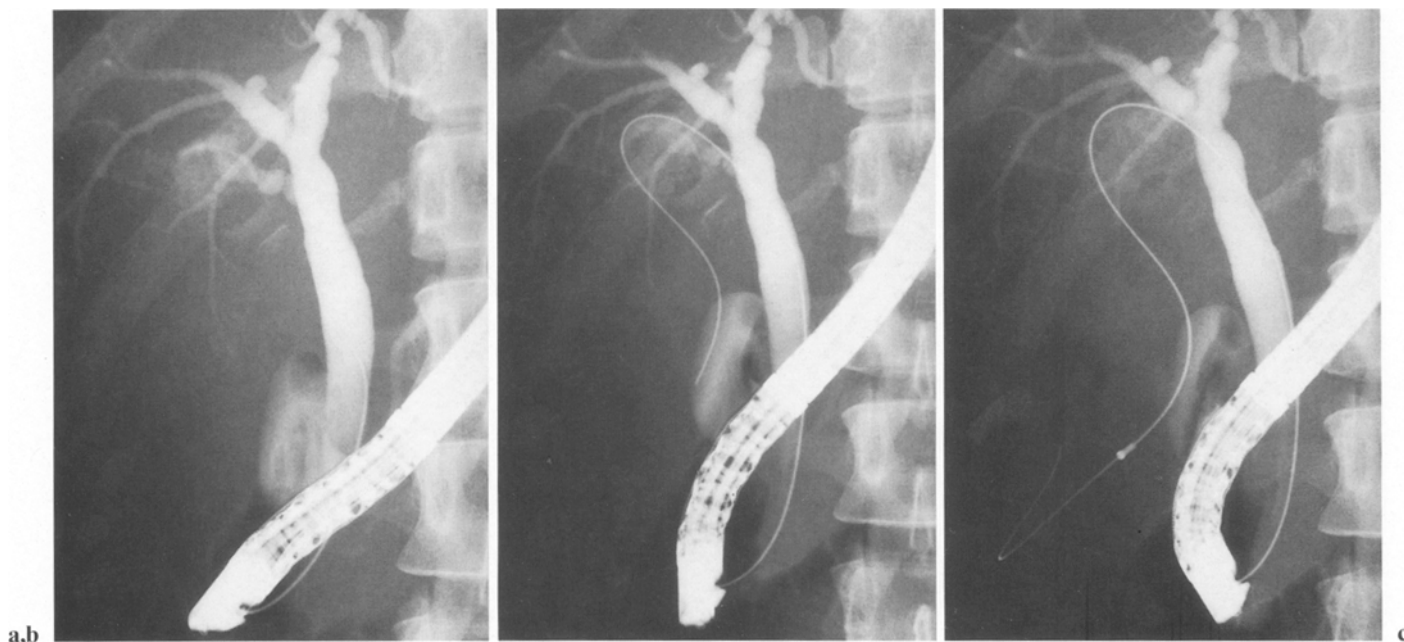


Fig. 2a-c. Case 1. Endoscopic retrograde cholangiography (ERC) shows the normal biliary tree. **a** A large stone impacted in the neck of the gallbladder was partly visualized. **b**

Radifocus (Terumo) guidewire was passed beyond the obstructing stone. **c** A drainage catheter was inserted into the gallbladder over the guidewire

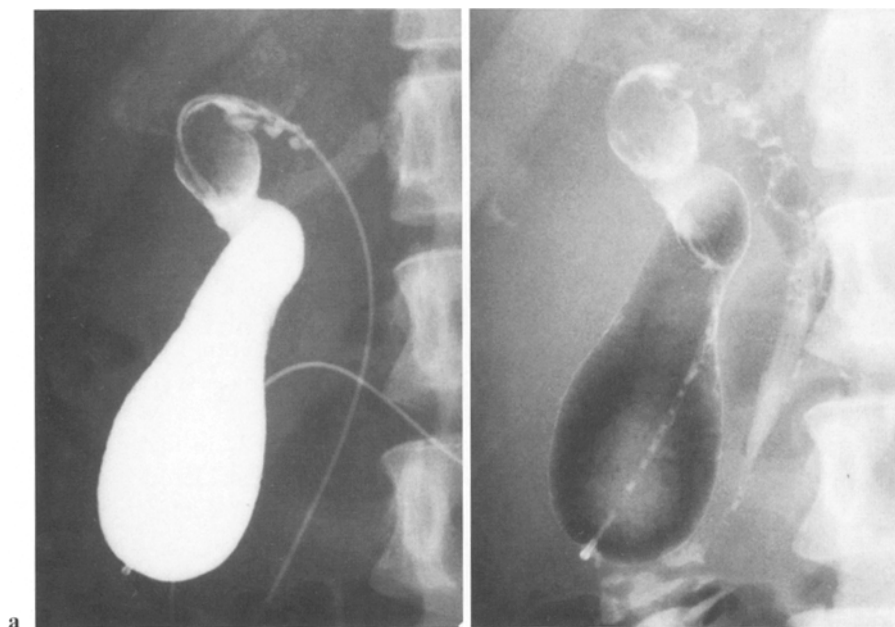


Fig. 3a,b. Case 1. **a** Cholecystogram, via the drainage catheter, shows the impacted stone 7 days after ETGBD was performed. **b** Clear image of the gallbladder mucosa was obtained by the double-contrast method, using 3 ml of 60% Urografin (meglumine sodium amidotrizoate; Schering, Germany) and 20 ml of CO₂ gas

gallbladder neck (Fig. 3a). A clear image of the gallbladder mucosa was obtained by the double-contrast method (Fig. 3b). Two weeks after the cholecystography, laparoscopic cholecystectomy was performed safely.

Case 2. An 83-year-old man presented at our hospital with fever and right upper quadrant pain. Abdominal ultrasound showed an enlarged gallbladder with thickened wall. A gallstone could not be detected. Serum

total bilirubin (2.4 mg/dl; normal range, 0.2–1.1) and CRP levels (17.1 mg/dl; normal range, 0–0.5) were elevated. ERC showed smooth stenosis of the common hepatic duct due to compression by the enlarged gallbladder (Fig. 4a). These features were characteristic of the Mirizzi syndrome. An impacted gallstone in the gallbladder neck was suddenly released by manipulation of the guidewire and catheter during ETGBD, allowing contrast medium to enter the gallbladder

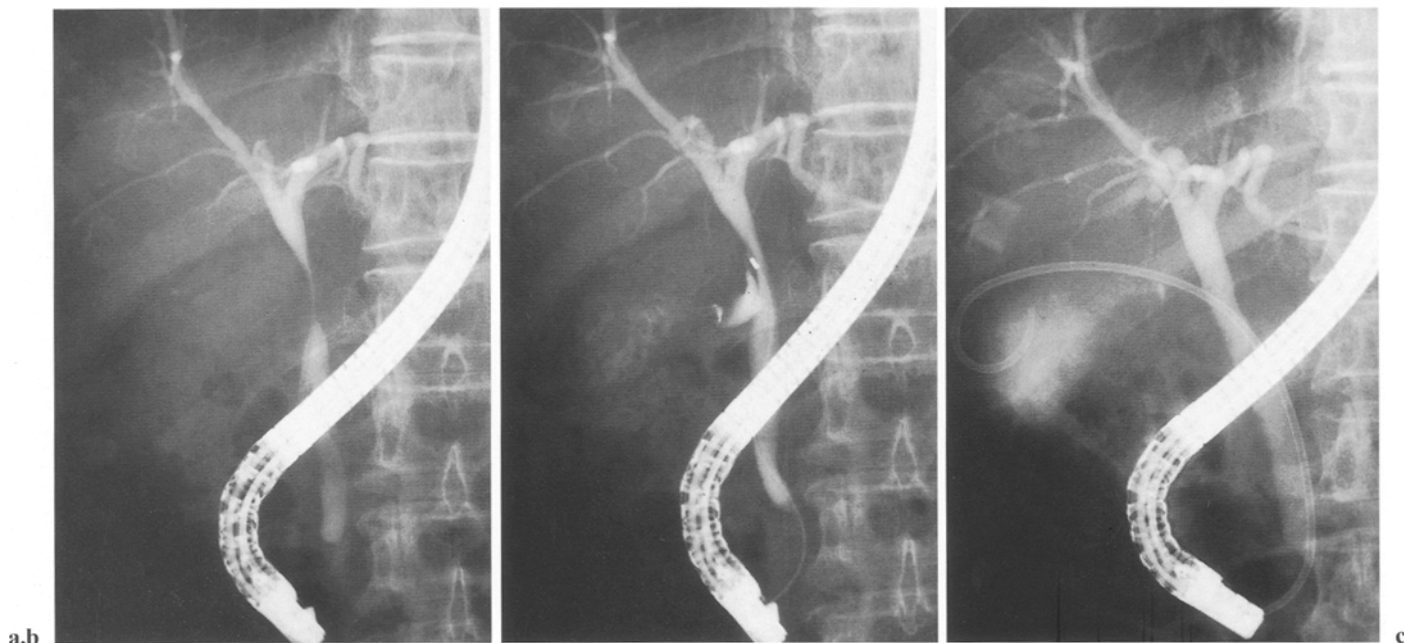


Fig. 4a–c. Case 2. ERC **a** showing smooth stenosis of the common hepatic duct, probably due to extrinsic compression. **b** Impacted stone was released by manipulating the guidewire

and the catheter. **c** The common hepatic duct returned to its normal caliber immediately after the aspiration of 100ml of bile

(Fig. 4b). After the introduction of a 7.2-Fr drainage catheter and the aspiration of 100ml of infected bile from the gallbladder, the bile duct returned to normal size (Fig. 4c) and the pain was alleviated. Four days later, levels of CRP and WBC were normal. This patient was effectively treated by one aspiration. He had no recurrence of cholecystitis during 3 months of follow-up.

Discussion

We have previously reported success rates of 50% in 1990⁶ and 70% in 1994⁹ for endoscopic transpapillary catheterization in the gallbladder. In the present study, the success rate was increased to more than 80%, reflecting improvement of the catheterization technique according to a learning curve. A new type of disposable guidewire, the Radifocus (Terumo), has also now become available. The 260-cm-long, 0.032-inch guidewire with a 3-cm angulated soft tip was especially useful. In the present study, ETGBD failed in three patients because it was difficult to visualize the opening of the cystic duct under fluoroscopy. In another patient, it was difficult to insert the guidewire into the angular cystic duct. In our experience, once a guidewire has been inserted into the cystic duct up to at least 1 cm, it can be effectively passed beyond the obstructing stone or narrowed duct. To further increase the success rate, it may be necessary to visualize the bifurcation of the cystic and bile duct clearly by means of C-arm fluoroscopy or cholangioscopy.

Our study showed that ETGBD without EST was very effective in relieving the symptoms of acute cholecystitis quickly and in reducing inflammation without any severe complications. Accurate diagnosis by ERCP, just before ETGBD, may determine whether acute cholecystitis (with or without cholangitis) entails gallbladder stones or common bile duct stones. Such diagnosis is crucial for choice of the proper drainage method (cholecysto-drainage or choledocho-drainage) in such patients. Our study demonstrated that ETGBD following ERCP was very useful for both diagnosis and treatment in patients with the Mirizzi syndrome, as shown in Fig. 4.

We successfully performed ETGBD in two patients who had DIC. PTGBD could be considered in these particular patients but it may be more dangerous because of the strong bleeding tendency. Therefore, ETGBD without EST seems to be the only safe drainage procedure for these high-risk patients. The inflammation of the gallbladder in most patients with acute cholecystitis can be improved by the systemic administration of antibiotics. However, those with bacteremia or DIC, and those who are poor operative risks require immediate relief of their symptoms and the pathophysiological condition. In this context, we prefer ETGBD to medical treatment and PTGBD in such patients because: (i) Patients become asymptomatic and recover more quickly; (ii) the inflammation is rapidly reduced; and (iii) there have been no severe complications associated with ETGBD.

The method used for gallbladder drainage in patients with acute cholecystitis should be safe and minimally invasive. During the past decade, ultrasound-guided PTGBD has become popular as a conservative treatment to avoid emergency surgery, which can be associated with a high mortality rate. PTGBD has been reported to have a high rate of success and efficacy; however, various complications, such as bile peritonitis, intra-abdominal bleeding, bacteremia, shock, and dislodgement of the drainage catheter, have been reported.^{17,18} In contrast, there was no single case of severe complications associated with ETGBD in our series. Although we had a concern in relation to pancreatitis, none of our patients developed this complication. The short period of catheterization into the papilla and the small caliber of the catheter may account for the absence of pancreatitis.

Recent reports of the treatment of acute cholecystitis by percutaneous transhepatic needle aspiration have indicated that continuous drainage of the gallbladder might not be necessary to reduce inflammation.^{19,20} This finding suggests that one-time aspiration of infected bile from the gallbladder may be as effective as percutaneous transhepatic needle aspiration. We found that one-time aspiration was effective, without recurrence of cholecystitis, in four patients in our series, including the two with the Mirizzi syndrome. It can be asserted that ETGBD is not only effective but that it is also the least invasive treatment for acute cholecystitis. However, a controlled trial with a large number of patients is necessary before conclusions about the real efficacy of this method can be drawn.

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