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GASTROINTESTINAL ENDOSCOPY

Endoscopic treatment of Mirizzi's syndrome

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Electrohydraulic lithotripsy has been shown to be an effective non-surgical treatment for common bile duct and intrahepatic duct stones. This technique was applied via the endoscopic retrograde route in 14 patients (mean age, 70) with the Mirizzi syndrome, all of whom were at high risk for surgery. The procedure was performed under strict cholangioscopic guidance. Twelve patients had a single stone and two had multiple stones impacted in the cystic duct. Stone diameter was 1.5 cm in one patient, 2 to 3 cm in nine patients, and greater than 3 cm in four patients. Insertion of the babyscope and stone fragmentation were successful in all patients. Complete stone clearance required one session in 12 patients and two sessions in two patients (both with multiple stones). In one patient post-procedural leakage of contrast medium from the cystic duct into the peritoneal cavity was noted. This was attributed to pressure necrosis induced by the impacted stone. The patient had an uneventful course of recovery, and leakage resolved with conservative management. Mortality was zero. Endoscopic treatment of the Mirizzi syndrome with electrohydraulic lithotripsy seems to be an effective and relatively safe alternative to surgery. (Gastrointest Endosc 1993;39:532-6.)

The Mirizzi syndrome is commonly defined as common hepatic duct obstruction caused by extrinsic compression from an impacted stone in the cystic duct.[1,2] Obstruction may be caused by compression from the stone itself or by accompanying inflammation. Kehr3 first drew attention to this pathologic process in 1905. He attributed common hepatic duct obstruction to inflammation of the gallbladder neck and adjacent hepatoduodenal ligament accompanying the stone impaction in the cystic duct. The syndrome was given international recognition by Mirizzi[4] in 1948. Mirizzi postulated the existence of the "functional hepatic syndrome," characterized by stasis and cholangitis without common bile duct stones. Among other causes, he reported cystic duct stones as one cause for this syndrome.

The treatment of the Mirizzi syndrome has traditionally been surgical. Endoscopic treatment via the retrograde route has not been previously described. Conventional methods of endoscopic stone extraction usually fail because of inability to access or capture the impacted cystic duct stone. Recent studies have reported the successful use of electrohydraulic lithotripsy (EHL) to fragment large or impacted biliary stones.[5-10] This prompted us to apply this modality under cholangioscopic guidance to treat the Mirizzi syndrome. We describe our experience in a series of 14 patients.

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MATERIAL AND METHODS

Patients

During a 34-month period (1989 to 1992), 14 patients diagnosed on endoscopic retrograde cholangiography (ERC) to have the Mirizzi syndrome were entered into this study. All had failed previous attempts at endoscopic stone extraction including mechanical lithotripsy. There were 10 women and 4 men with a mean age of 70 years (range, 24 to 94). Thirteen patients, all older than 65 years, were considered poor candidates for surgery on the basis of compromised cardiorespiratory or metabolic conditions (heart failure in six patients, chronic obstructive lung disease in two patients,

kidney failure in two patients, insulin-dependent diabetes mellitus in two patients, and morbid obesity in one patient). One patient was a 24-year-old man who had undergone a cholecystectomy 2 weeks earlier.

Presenting symptoms included abdominal pain in seven patients, abdominal pain and fever in three patients, and painless jaundice in four patients. In one patient a biliocutaneous fistula in conjunction with painless jaundice developed 2 weeks after standard cholecystectomy (see preceding paragraph). All patients had elevation of alkaline phosphatase levels, and 11 patients had elevation of serum bilirubin levels (twofold to threefold in four patients, more than threefold in seven patients). Ultrasonography before the procedure showed common bile duct dilation in 12 patients, a stone in the region of the common bile duct in 12 patients, and cholecystolithiasis in 11 of 13 patients with gallbladders.

On ERC the cystic duct joined the upper third of the bile duct in two patients, the middle third in nine patients, and the lower third in three patients (Fig. 1). Twelve patients had a single stone impacted at the lower end of the cystic duct, and two patients had multiple stones in the cystic duct (Fig. 2). Stone diameter (largest stone) was 1.5 cm in one patient, 2 to 3 cm in nine patients, and greater than 3 cm in four patients.

Ten patients were referred from outlying hospitals. All had undergone prior ERC, papillotomy, and attempted endoscopic stone extraction. One patient had two extracorporeal shock-wave lithotripsy treatments without fragmentation effect. One patient had undergone chemical contact dissolution therapy over a 10-day period via nasobiliary catheter, followed by a second unsuccessful attempt at basket stone extraction.

Equipment

Cholangioscopy was performed with the "mother and baby" endoscope system (Olympus models TJF M20 and CHF B20, Olympus America Inc., Lake Success, N.Y.). The motherscope had an operating channel of 5.5 mm for passage of the babyscope. The babyscope had a 1.7-mm channel. The tip of the babyscope could be flexed in two directions (160 degrees up and 100 degrees down).

The equipment for EHL consisted of a 4.5F flexible probe connected to a shock-wave generator unit (Lithotron EL 23, Walz Electronics Inc, Rohrdorf, Germany). The tip of the probe contained a spark gap chamber. The generator was set to discharge 12 impulses per second in salvos of 3 impulses. The energy was set at 0.46 joules per impulse. The probe had a lifetime of 1601 impulses per use (total of 736 joules).

Technique

Systemic antibiotic coverage and standard intravenous pre-medication was administered. A diagnostic ERC was performed with a standard duodenoscope and a papillotomy was performed. If a papillotomy had already been performed, its adequacy was checked and the incision extended if necessary. A 7F nasobiliary catheter was inserted into the common bile duct to allow for instillation of contrast medium and saline. The duodenoscope was then exchanged for the motherscope. After the motherscope was positioned opposite the papilla, the babyscope was passed through the operating channel of the motherscope and inserted alongside the nasobiliary catheter into the distal common bile duct. The bile duct was then examined cholangioscopically.

The EHL probe was inserted through the operating channel of the babyscope and extended 2 to 3 mm from the tip. Before lithotripsy was performed, saline was instilled via the nasobiliary catheter to provide a fluid medium around the stone. The tip of the probe was positioned in direct contact with the stone surface and 1 to 2 seconds of shock-wave energy applied. This was repeated as needed to achieve fragmentation. Stone fragments larger than 0.5 cm in diameter were re-fragmented. A maximum of one probe was used per session. After lithotripsy, fragments were extracted with the Dormia basket. If multiple sessions were required, the nasobiliary catheter was left in position and the patient scheduled to return 3 days later. Ductal clearance was confirmed by cholangiography.

RESULTS

Insertion of the babyscope alongside the in-dwelling nasobiliary catheter was successful in all patients. The obstructing stone was readily visualized at the cystocholedochal junction. In the 12 patients with a single stone, complete clearance was achieved in one treatment session. In most cases the full lifetime of the EHL probe was required to achieve complete fragmentation. Two patients with multiple stones required an additional treatment session (lowermost stone fragmented in the first session, upper stones in the second).

The median time required for the entire procedure was 60 minutes (range, 40 to 120 minutes). This comprised 20 minutes to insert the nasobiliary tube and babyscope, 25 minutes to fragment the stone, and 15 minutes to clear the cystic duct with the Dormia basket.

Asymptomatic leakage of contrast medium from the cystic duct into the peritoneal cavity was observed in one patient after removal of a large (3.5 cm) impacted cystic duct stone. A nasovesicular catheter was placed, and the patient responded to conservative therapy with intravenous fluids and antibiotics. The patient was discharged free of symptoms 2 weeks later. The remaining patients had good recovery without adverse events. Hospital stay ranged from 3 to 8 days.

DISCUSSION

The Mirizzi syndrome is a relatively rare complication of gallstone disease. It has been reported in 0.7 % to 1.1 % of patients undergoing cholecystectomy.li Biliary endoscopists are encountering this syndrome more frequently as ERCP becomes more widespread in the evaluation of obstructive biliary tract disease. Until now the role of endoscopy has been limited to pre-operative diagnosis.lz-i4 Endoscopic treatment usually fails because of inability to access or capture the impacted stone with the basket or balloon catheter.

EHL is a well-established modality for the treat-

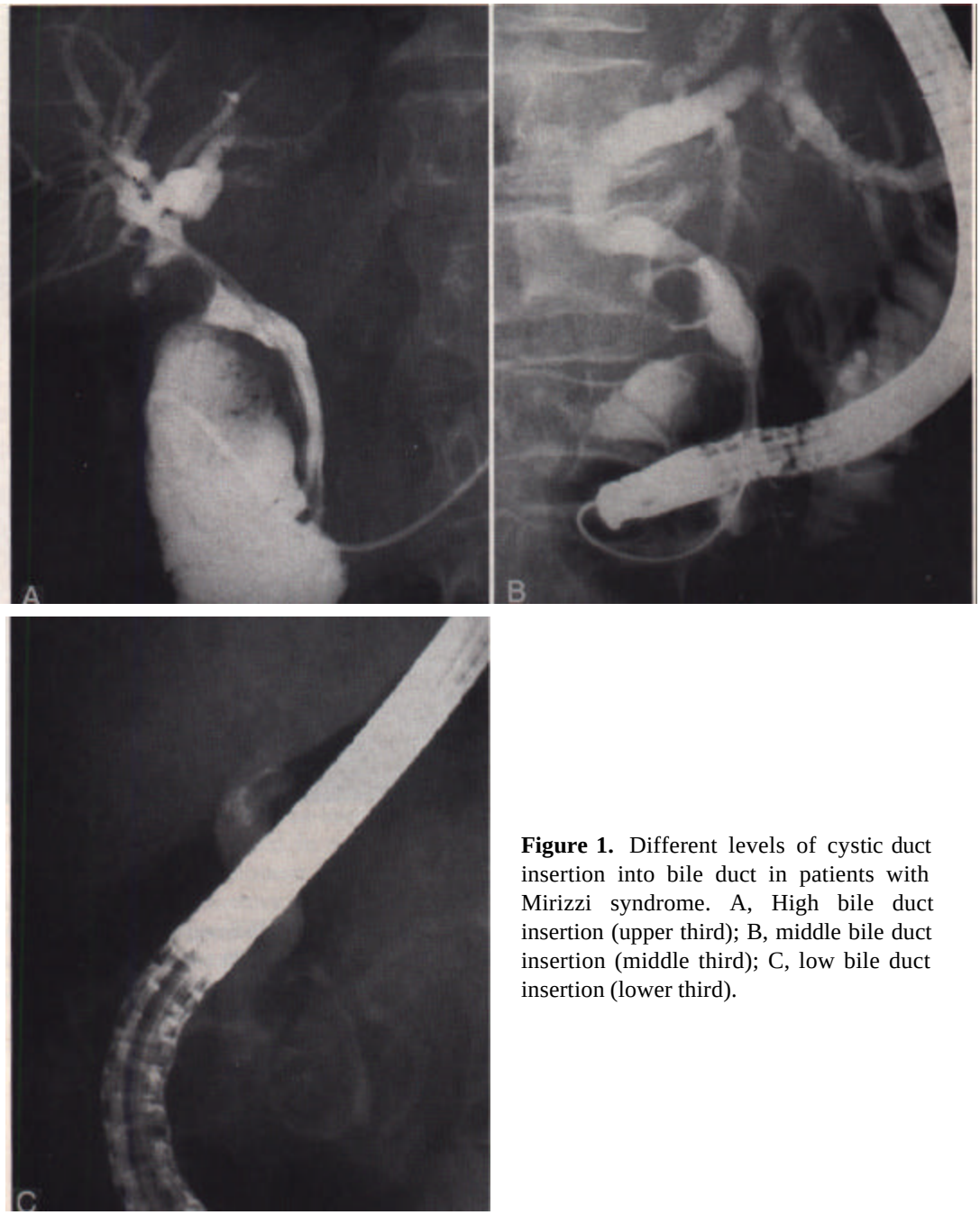

Figure 1. Different levels of cystic duct insertion into bile duct in patients with Mirizzi syndrome. A, High bile duct insertion (upper third); B, middle bile duct insertion (middle third); C, low bile duct insertion (lower third).

ment of renal stones. 15 More recently it has been applied to fragmentation of large or impacted stones in the biliary tract.5-to In this study, we used EHL via the retrograde route to treat the Mirizzi syndrome. We performed this procedure under direct cholangioscopy to minimize the risk of injury to the bile duct wall. We were able to endoscopically identify the cystic duct stone in all cases and apply shock waves in a targeted manner. Complete fragmentation and clearance of the cystic duct was achieved in all patients. With the exception of two patients who had multiple stones, fragmentation and clearance was achieved in a single treatment session.

Leakage of contrast medium from the cystic duct into the peritoneal cavity was observed in one patient after removal of a large (3.5 cm) cystic duct stone. We do not believe that this was procedure-related because the probe was applied to the surface of the stone under direct vision and shock-wave injury to the ductal wall was not observed during EHL. We noted that the mucosal lining of the markedly dilated cystic duct appeared inflamed and ulcerated, which suggested that

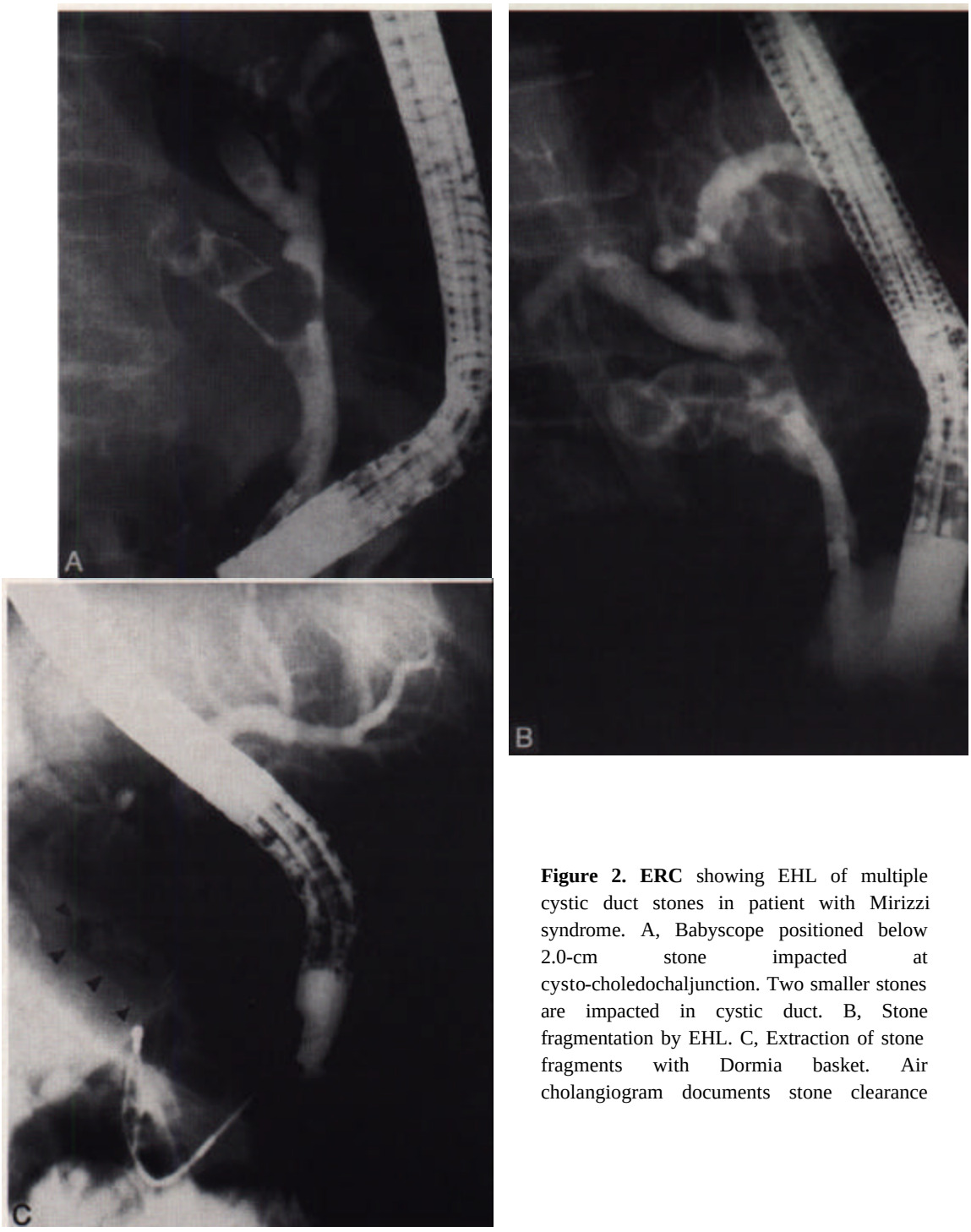

Figure 2. ERC showing EHL of multiple cystic duct stones in patient with Mirizzi syndrome. A, Babyscope positioned below 2.0-cm stone impacted at cysto-choledochaljunction. Two smaller stones are impacted in cystic duct. B, Stone fragmentation by EHL. C, Extraction of stone fragments with Dormia basket. Air cholangiogram documents stone clearance

leakage was a result of pressure necrosis induced by the impacted stone. The leakage resolved promptly with conservative management.

We did not encounter any difficulties accessing the stones with the babyscope for lithotripsy. However, it should be noted that stones were impacted at the junction of the cystic duct and bile duct and therefore readily accessible with the babyscope. Two patients had multiple stones filling the cystic duct; after fragmentation and removal of the lowermost stone, the dilated cystic duct was intubated with the babyscope to access the more proximal stones. Because none of the patients had stone impaction isolated to the proximal cystic duct or neck of the gallbladder, we cannot comment on the feasibility of EHL in these variant presentations of the Mirizzi syndrome. The success

will clearly be limited by the ability to pass the babyscope into the cystic duct.

Saline irrigation is necessary during EHL. First, a fluid medium is required for the generation and conduction of electrohydraulic shock waves. Second, it is necessary to flush away stone fragments to maintain a clear field of vision. Although it is possible to instill saline through the working channel of the babyscope, the flow is relatively weak, particularly when the EHL probe is in place. Therefore, we elected to instill saline through a nasobiliary catheter. This was inserted into the common bile duct before the babyscope was inserted. We were able to insert the babyscope alongside the nasobiliary catheter in all cases.

Percutaneous treatment of the Mirizzi syndrome with EHL under cholangioscopic control has been previously described in a case report.ls In this report the stone, impacted at the neck of the gallbladder, was first bypassed by a 7F catheter to drain a gallbladder empyema; in addition, a lOF prosthesis was inserted to drain a strictured common bile duct. Percutaneous EHL of the gallbladder stone was performed 2 weeks later. The endoscopic transpapillary approach has the advantage of being less invasive, and definitive treatment by lithotripsy can usually be accomplished in a single treatment session.

We conclude that the Mirizzi syndrome can be successfully treated endoscopically with EHL under cholangioscopic guidance. This broadens the application of EHL, which has already been used in a number of centers for the treatment of common bile duct and intrahepatic duct stones refractory to conventional extraction techniques. Because EHL can cause significant ductal wall injury, it should be used under strict cholangioscopic guidance. This technique should be limited to centers with extensive experience with the use of cholangioscopy.

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