Serial Cases of Combining ESWL and ERCP Procedures in Management Chronic Pancreatitis and Difficult Bile Duct Stones

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ABSTRACT

Extracorporeal shock wave lithotripsy (ESWL) has an established role in the management of pancreatic ductal calculi and as further treatment modality for large or difficult complicated common bile duct (CBD) stones. Combined with minimally invasive endoscopic procedure such as endoscopic retrograde cholangio-pancreatography (ERCP), it has replaced open surgery as the initial form of therapy. ESWL has also proved to be an effective therapy in treating intrahepatic stones that are refractory to routine endoscopic extraction. In these serial cases we present three cases which using combined ESWL and ERCP procedures to treat chronic pancreatitis pain and giant CBD stone that presenting good results on follow up without any complication.

Keywords: *ESWL, ERCP, chronic pancreatitis, CBD stone*

INTRODUCTION

Extracorporeal shock wave lithotripsy (ESWL) has an established role in the management of pancreatic ductal calculi. Combined with minimally invasive endoscopic decompression, it has replaced open surgery as the initial form of therapy. The principle of operation involves the generation of shock waves in or by reflection from an ellipsoid transducer. These shock waves continuously increase in intensity due to the large surface area of the human body, reaching a maximum intensity within a 3 to 10 mm focal area. Fragmentation rates with ESWL range from 75% to 100% and lead to complete stone clearance in 40–75% patients.[1-7] Risk factors for treatment failure include multiple stones, the presence of strictures, and a large stone burden. Although complete pancreatic stone clearance is ideal, it is successful endoscopic decompression with reduction in main ductal diameters that is statistically correlated with pain relief.[1,5,8] Following treatment, complete pain relief and a decrease in pain intensity was reported in 32-75% and 65-100% of patients, respectively. ESWL fragmentation of pancreatic ductal calculi in conjunction with endoscopic clearance of the main pancreatic duct is associated with significant improvement in clinical outcomes in most patients with chronic pancreatitis.[9,10]

ESWL is a further treatment modality for large common bile duct (CBD) stones.[11,12,13] Unlike gallstones, for which the method was first applied in the gastrointestinal tract, ultrasound scanning alone is adequate for localizing the concretions in only two thirds of patients. Before ESWL fragmentation, endoscopic pretreatment with endoscopic retrograde cholangio-pancreatography (ERCP), endoscopic sphincterotomy, and implantation of a nasobiliary catheter is universally mandatory. Today, fragmentation is usually performed under sedoanalgesia (e.g. midazolam and meperidine/ pethidine). In about 50% of cases, fragmentation can

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be performed under sonographic control, and in about 50% the instillation of diluted contrast medium is necessary for successful stone localization and control of the fragmentation process. Different single-center studies have shown the efficacy of ESWL for the treatment of large or impacted biliary calculi refractory to endoscopic extraction. Stone clearance rate was about 80% to 90% in series up to 310 patients; complications such as cholangitis or hematoma were rarely observed.[11,12,14] ESWL has also proved to be an effective therapy in treating intrahepatic stones that are refractory to routine endoscopic extraction. In 55 patients, stone clearance was achieved in 34% with ESWL alone and in 90% when ESWL was combined with laser lithotripsy and electrohydraulic lithotripsy (EHL).[11,15] The complication rate was 12%; all cases recovered with conservative management.

CASES ILLUSTRATION

Case 1. ERCP and ESWL Management on Chronic Pancreatitis with Multiple Pancreatic Duct Stones

A 12 year-old male patient referred to Cipto Mangunkusumo hospital from Timika Papua with chronic abdominal pain due to blunt trauma for 6 years. Laboratory result showed hemoglobin 7.8 g/dL, elevated ESR 145 mm/hour, amylase 1,088 U/L and lipase 1,327 U/L level. Abdominal ultrasonography (USG) showed pancreatitis with dilated pancreatic duct and intraductal multiple stones. Abdominal CT findings revealed chronic pancreatitis and calcification within pancreas. An ERCP procedure was done. After cannulation of main pancreatic duct and injecting contrast, the pancreatogram showed multiple dilatations and intraductal stones which the largest stone positioned in main pancreatic duct of the head of pancreas. We did plastic pancreatic stent placement in main pancreatic duct and proceed the patient for ESWL procedure to crush the stones. After ESWL crushing, a plain X-ray showed the stones becoming fragmented and a second ERCP procedure was done to extract the fragmented stones especially the largest group at the head area. We did endoscopic pancreatic sphincterotomy (EPS) and extracted fragmented stones using dormia basket, some stones easily discharge. After these procedures of ERCP and ESWL management, the patient really in good condition, free of pain, and the amylase and lipase level becoming normal (96 and 27 U/L respectively).

Case 2. ERCP and ESWL Management on Chronic Calcific Pancreatitis with Mean Pancreatic Duct Dilation Presenting by Chronic Upper Abdominal Pain

A 42 year old male patient came to Gastro-enterology Clinic Cipto Mangunkusumo hospital suffering upper abdominal pain especially since six months before admission. He has no history of alcohol consumption neither also smoking. There was only epigastric tenderness pain on physical examination. Laboratory result s showed erythrocytes sediment rate (ESR) 20 mm/hour, white blood cell count (WBC) 5,900/mL, platelets 221,000/mL, serum amylase 23 U/L, serum lipase 23 U/L. We found no significant abnormalities on upper and lower gastro-intestinal endoscopies. Magnetic resonance cholangio-pancreatography (MRCP) showed dilated mean pancreatic duct (MPD) with multiple calcification. An ERCP performed and showed MPD dilatation with multiple pancreatic stones especially at head area. A plastic pancreatic stent placement was done and then the patient proceeds to department of urology to get ESWL procedure to crush the stones. After 2 series of ESWL procedures, repeated ERCP was done to extract multiple fragmented pancreatic stones using small dormia basket after performing EPS. Many within plugs proteins came out discharging. Laboratory results post stones extraction showed amylase 36 U/L and lipase 25 U/L. The patient immediately free of pain after these procedures.

Case 3. ERCP and ESWL Management on Difficult Bile Duct Stones

A 49 year old female patient came to the Emergency Unit of Cipto Mangunkusumo hospital due to yellowish eyes and whole body skin since four days before admission. She had also nausea, epigastric pain, dark yellow urine, pale stool and fever. Her blood pressure 110/60 mmHg, heart rate 110/minute, respiratory rate 22/minute, temperature 38°C. Conjunctiva was pale, icteric sclera, and hepatomegaly. Laboratory results showed hemoglobin 6.5 g/dL, WBC 16,800/mL, platelets 586,000/mL, AST 116 U/L, ALT 93 U/L, gGT 410 U/L, ALP 1,506 U/L, total protein 5.3 g/dL, albumin 1.8 g/dL, total bilirubin 38.1 mg/dL, direct bilirubin 31.9 mg/dL and indirect bilirubin 6.11 mg/dL. No ECG and CXR abnormalities. Abdominal USG showed dilatation of CBD suggestive bile duct stone in distal CBD with no stone in the gallbladder. An ERCP procedure was done which showed mobile giant stone 30 mm x 20 mm in CBD, then a plastic stent 7 fr - 10 cm was placed at hilar of common hepatic duct. A 2 series of ESWL procedure, were done to the patient to crush the stone and then ERCP was done again to extract multiple fragmented stones using dormia basket and balloon extraction. After procedures the patient condition becoming well, no fever. Laboratory results showed hemoglobin 10.2 g/dL, white blood cell 10,000/mL, total bilirubin 2.22 mg/dL, direct bilirubin 2.31 mg/dL, indirect bilirubin 0.09 mg/dL and albumin 3.3 g/dL.

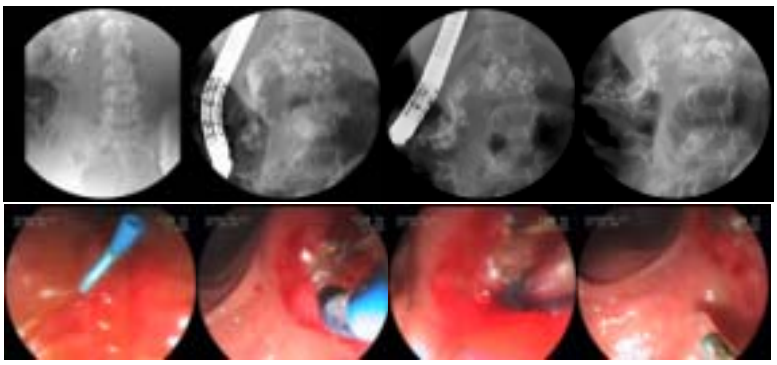

Figure 1. Pancreatic stent placement followed by crushing stones with ESWL and pancreatic duct stones extraction with dormia basket

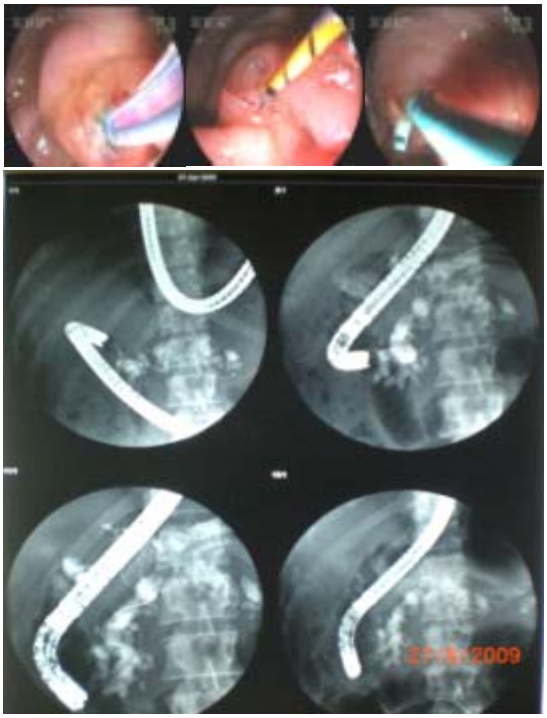

Figure 2**.** Multiple pancreatic duct stones with dilated mean pancreatic duct

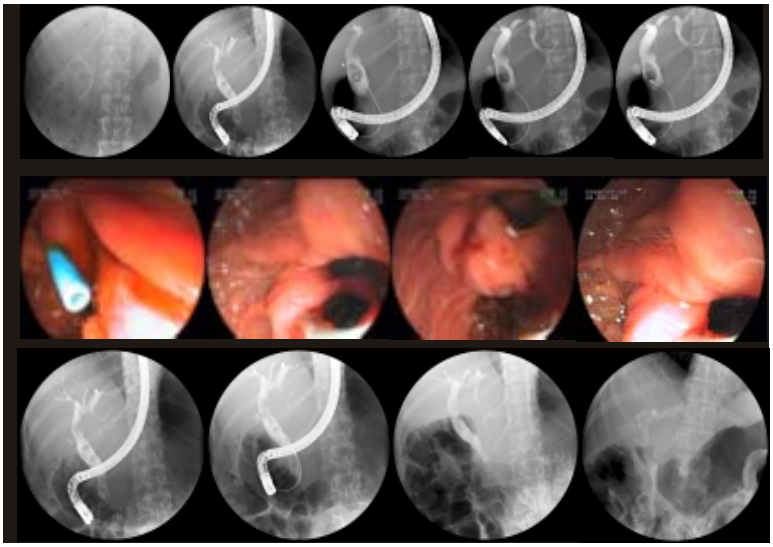

Figure 3. Giant mobile bile duct stone becoming fragmented after crushed by ESWL and then extracted with dormia basket

DISCUSSION

The use of ERCP in combination with ESWL techniques has become increasingly common in patients with chronic pancreatitis and complicated common bile duct stones. Chronic pancreatitis (CP) is a progressive disease for which there is no curative treatment. Therapeutic efforts have therefore centered on palliative treatment of the severe pain associated with this condition.[16] Relief of pain is the main indication of endotherapy of chronic pancreatitis.

The pathogenesis of the pain is still poorly understood. The mechanism most widely thought to be responsible is the increased pancreatic parenchymal pressure. This pressure is secondary to increased ductal pressure resulting from an outflow obstruction caused by strictures, pancreatic stones, or compressing pseudocysts and to a reduced parenchymal compliance caused by fibrosis.[16,17,18]

Though pathogenesis of pain in chronic pancreatitis is poorly understood and is considered multifactorial, ductal hypertension accounts for major component of pain. Pancreatic ductal blockade due to strictures and stones and decreased parenchymal compliance because of fibrosis leads to increased intraglandular pressure and ischemia resulting in pain.[19,20] Relief of pain in 70% to 90% of cases following endoscopic or surgical decompressive procedures supports this theory. Whether early ductal drainage changes the natural history of progressive exocrine and endocrine dysfunction is not certain. There is some experimental[19,21] and clinical evidence[19,22] of these collateral benefits.

In patients with CP, the favorable results of surgical and endoscopic decompressive procedures that relieve pain in 70% to 90% of cases[23,24] support the possibility that ductal obstruction triggers this pain. Furthermore, it has been shown that recurrent pain attacks after ductal decompression procedures are usually caused by recurrent ductal obstruction.[2] When the pancreas lacks compliance, ductal hypertension induces tissue hypertension that impairs blood flow and may cause ischemia.[20] In an experimental model of CP resulting in increased intraductal pressure, it was observed that the reduction in pancreatic blood flow was partially reversed after relief of the obstruction of the main pancreatic duct (MPD) by surgical drainage or by ductal stenting.[25] In the same model, pancreatico-jejunostomy improved the pancreatic blood flow more in early CP than in established CP[26] under both basal and stimulated secretory conditions, indicating that an earlier treatment of the pain symptoms might be beneficial for long-term outcome.[16]

Successful of stones extraction after sphincterotomy depends on size, number, location and presence of associated strictures. Stones < 10 mm located in head and body and three or less in number had greater clearance rate.[19,27] In single center retrospective study of 125 patients of chronic pancreatitis with ductal stones[28] had 85% technical success rate with complete ductal clearance in 50/125 and partial in 55/125 cases. ESWL was needed in 91% cases in addition. Regular stent exchanges were needed in 70 patients. No serious complications were reported. Eighty-five patients had a mean follow up of 29 months and nearly half remain pain free. Repeated endotherapy in rest could achieve 93% clinical success rate. Only 15 patients needed elective surgery. Middle age, stones near ampulla and early stage of chronic pancreatitis were associated with higher ductal clearance rate on univariate analysis.[19]

ESWL was found to be the best independent predictive factor for MPD clearance on multivariate analysis of 70 patients.[4,19] ESWL alone without pancreatic sphincterotomy could attain ductal clearance in 24/32 (75%) patients. Twenty two patients in this series had no strictures and only 2/32 had overt exocrine insufficiency. Fifty percent patients relapse within 1 year follow up.[19,29]

The aims of therapeutic endoscopy in CP include: (1) pancreatic ductal drainage in patients with chronic pain or recurrent attacks of pancreatitis, a procedure which can be performed soon after the onset of symptoms; (2) the treatment of complications such as pseudocyst and biliary obstruction. Whether immediate treatment can change the natural history of progressive loss of exocrine and endocrine function is still not known, even though experimental[21] and clinical[22] evidence suggests that ductal decompression may be beneficial in modulating CP outcome.[16]

ESWL can also be used for giant CBD stones not amenable to regular ERCP or mechanical lithotripsy. The latest models of ESWL are more patient-friendly and the procedure can be performed under sedation. ERCP and papillotomy are still required in most cases for localization of the stones. A nasobiliary catheter is placed for cholangiography. Alternatively, percutaneous cholangiography can be employed for stone localization. Even if fragmentation by ESWL is successful, the resultant stone fragments are often too big to pass out spontaneously and must be removed by either ERCP or percutaneous cholangioscopy.[30] There are many studies reporting high ductal clearance rates. In a multicenter study conducted in Germany, the success rate was 86%, with a mortality rate of only 1.8%.[30,31] Other series also reported similar outcomes, with cholangitis being the most frequent complication. The most recent report by Ellis et al studied 83 patients with retained bile duct stones treated by the third-generation lithotriptor.[12] Complete stone clearance was achieved in 69 (83%) patients.

Complications included six cases of cholangitis, and one perinephric hematoma which resolved spontaneously.[12,30] Amplatz et al found and concluded that ESWL is a safe and effective therapy in those patients in whom endoscopic techniques have failed with a clearing rate of 90.2% of refractory bile duct stones with a low rate of complications. Complications were recorded in 34 patients (9.1%); 22 patients experienced symptomatic cardiac arrhythmia, four hemobilia, two cholangitis, three hematuria, 3 dyspnea; no deaths were associated with the procedure.[32]

Here in this serial cases report, we also successfully did combining ERCP and ESWL procedures in treating chronic pancreatitis pain and giant CBD stone with good results.

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