

Extracorporeal Shock Wave Lithotripsy (ESWL) without Endoscopic Lithotomy for Pancreatolithiasis : A Report of Two Cases

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Extracorporeal shock wave lithotripsy (ESWL) without endoscopic sphincterotomy (EST) for pancreatic duct stones was performed in two patients with chronic pancreatitis.

Case 1 was a 37-year-old man. Pancreatic stones were observed in the pancreatic head and tail region with a persistent pancreatic fistula. ESWL without EST for pancreatolithiasis was performed two times. Almost all the stones in the pancreatic head were disintegrated without any complications by ESWL (4700 shock waves at 24.0 KV) under fluoroscopic control using a lithotripter (Dornier MLF 5000). Consequently, the fistula closed and the pancreatic exocrine function recovered.

Case 2 was a 65-year-old woman suffering from chronic relapsing pancreatitis with calcified stones in the pancreatic head region. ESWL (5700 shock waves at 23.0 KV) without EST produced complete disintegration of the stones without any complications. Seven days later, almost all of the stones in the pancreatic head were diminished. Thereafter, we observed not only amelioration of the symptoms of pancreatitis but also improvement in pancreatic exocrine function.

Thus, ESWL treatment without EST was a safe and effective method for pancreatolithiasis and should be considered a high-priority non-surgical treatment for pancreatolithiasis.

Introduction

Extracorporeal shock wave lithotripsy (ESWL) has been used in recent years as a non-surgical therapy for pancreatolithiasis and has gained considerable attention for its effectiveness. We performed ESWL in two patients with pancreatolithiasis : one had a pancreatic fistula following multiple thoracic and abdominal injury including the pancreas while the other had chronic pancreatitis with acute exacerbations. Favorable results were obtained in both cases.

Case Reports

Case 1 : A 37-year-old man was diagnosed with chronic pancreatitis and pancreatolithiasis in 1985, and he had undergone laparotomy and drainage for chronic pancrea-

titis with acute exacerbation on two occasions. He had been drinking heavily every day since the age of 19 and he had been receiving treatment for diabetes since 1989.

On March 20, 1993, he underwent thoracotomy and laparotomy for multiple stab wounds injuring the lung, liver, pancreas, transverse colon and mesentery, and at that time he had received sutures, hemostasis, and underwent partial resection of the transverse colon and transverse colostomy. Obstructive jaundice appeared 2 days after surgery, necessitating percutaneous transhepatic bile duct drainage (PTBD). This PTBD was later converted to internal drainage, and the patient was discharged.

On October 4, 1993, a subcutaneous abscess was found in the same wound of the abdominal upper median incision, and the patient was admitted to our hospital.

On admission, he was rather poorly nourished (170 cm, 48 kg) with slight anemia, but no jaundice was noted. The laboratory data showed increased levels of urinary amylase, blood glucose and biliary enzymes such as alkaline phosphatase and γ -glutamyl transpeptidase (Table 1).

Cholangiography via the PTBD tube and, simultaneously, fistulography via the upper abdominal abscess demonstrated communication with the pancreatic duct, or so-called pancreatic fistula. Pseudocysts were found in the head and tail of the pancreas. In the head of the pancreas, stones were lodged in the main pancreatic duct, and the pancreatic part of the common bile duct and accessory

Table 1. Laboratory Data on Admission (Case 1)

	Hematology	T. Bil	0.5 mg/dl
WBC	8100/mm ³	D. Bil	0.2 mg/dl
RBC	290×10 ⁴ /mm ³	S-Amy	310 IU/l
Hb	9.4 g/dl	U-Amy	4785 IU/l
Ht	28.5%	Glu	421 mg/dl
Plt	18.5×10 ⁴ /mm ³	GOT	24IU/l
		GPT	26 IU/l
	Blood Chemistry	γ -GTP	1178 IU/l
TP	7.6 g/dl	ALP	246 IU/l
TTT	3.6 U	LAP	282 IU/l
ZTT	12.7 U	Ch-E	0.43 Δ pH

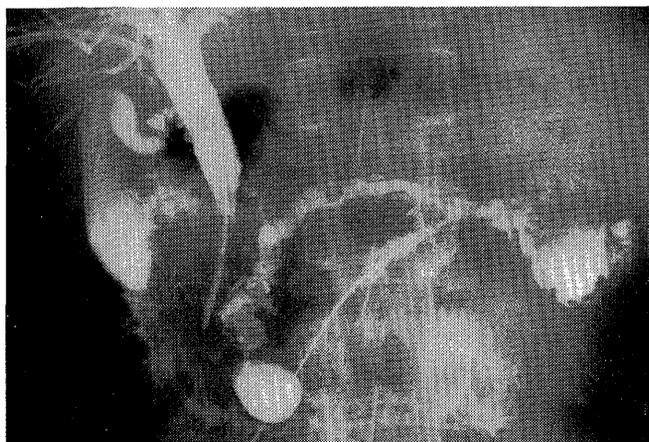


Fig. 1. Cholangiogram via the PTBD tube and, at the same time, fistulography via the upper abdominal abscess. Stones are lodged in the main pancreatic duct at the head of the pancreas, and the pancreatic part of common bile duct and accessory pancreatic duct show stenosis.

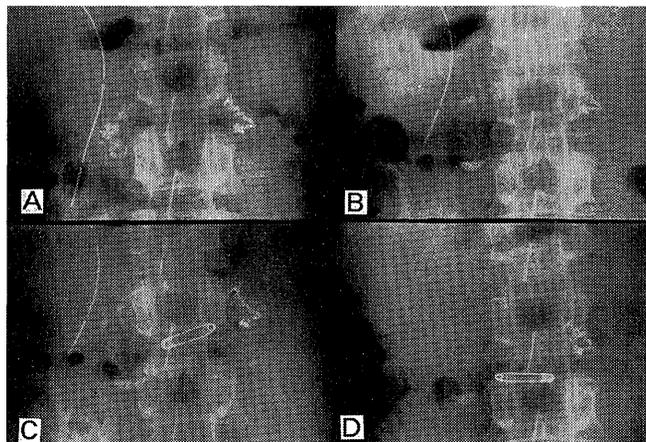


Fig. 2. Plain abdominal X-rays in case 1
 A ; before the first ESWL.
 B ; two days after the first ESWL.
 C ; before the second ESWL.
 D ; seven days after the second ESWL.
 The calcifications at the head of the pancreas gradually decreased and disappeared.

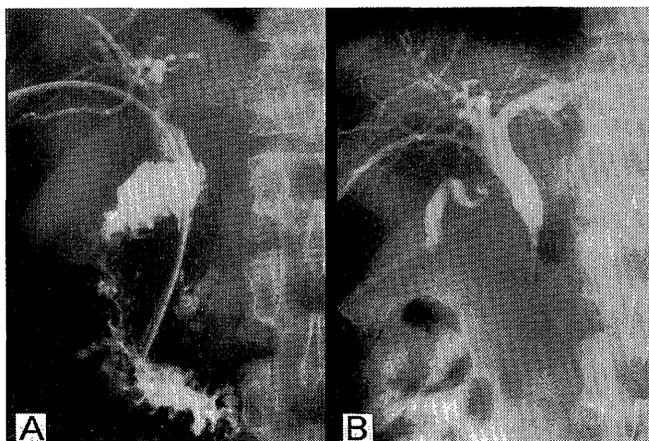


Fig. 3. Cholangiogram via the PTBD tube before and after ESWL in case 1.
 A ; before ESWL
 B ; after completing the second ESWL.
 The post-ESWL image shows reduced calcification at the head of the pancreas.

pancreatic duct showed stenosis (Fig. 1), suggesting that the presence of the stones increased the internal pressure in the pancreatic duct and led to the formation of the pancreatic fistula. We therefore considered the fistula to be curable by removal of the pancreatic stones and performed ESWL twice in this patient. ESWL was performed under fluorescence using a lithotripter MFL-5000 made by Dornier Corporation. A total of 4700 shock waves were administered at a maximum output of 24 KV.

After ESWL, the stones completely disappeared from the head of the pancreas (Figs. 2, 3, 4). The volume of drainage from the pancreatic fistula decreased gradually and the pancreatic fistula closed. However, the pancreatic

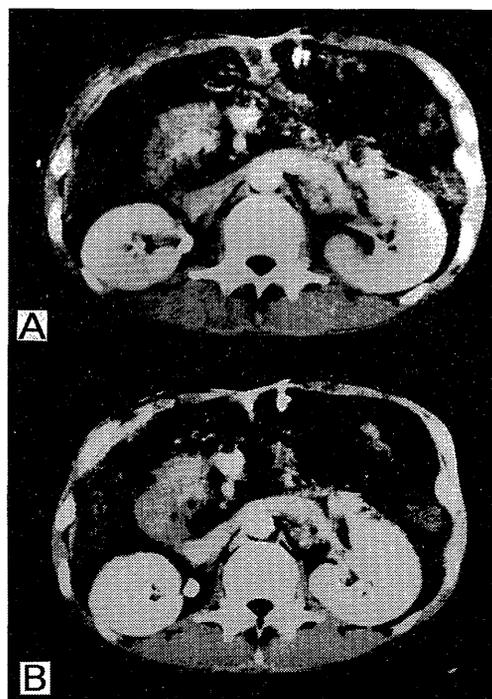


Fig. 4. The CT images before and after ESWL in case 1.
 A ; before ESWL
 B ; after completing the second ESWL.
 The post ESWL image shows reduced calcification at the head of the pancreas.

fistula recurred as a result of the narrowing of the main pancreatic duct at the head of the pancreas. The fistula subsequently became infected, and the patient died of sepsis complicated with disseminated intravascular coagulopathy (DIC).

Case 2: A 65-year-old woman was admitted to our hospital complaining of sudden onset of epigastralgia and vomiting on September 6, 1994.

She had been taking insulin orally for diabetes since 1992. Her family history was a non-contributory factor.

On admission, she showed remarkable tenderness in the upper abdomen and back. The laboratory data revealed an increase in serum and urinary amylase, blood glucose, HbA1 and HbA1c (Table 2). She was diagnosed as having chronic pancreatitis with acute exacerbation and received appropriate medication.

At the time of admission, plain abdominal X-rays demonstrated calcification of the head of the pancreas and, to a smaller extent the tail of the pancreas (Fig. 5a).

Table 2. Laboratory Data on Admission (Case 2)

Hematology		GOT	15 IU/l
WBC	9600/mm ³	GOT	12 IU/l
RBC	426 × 10 ⁴ /mm ³	Glu	201 mg/dl
Hb	12.8 g/dl	BUN	10.2 mg/dl
Ht	36.9%	Crea	0.9 mg/dl
Plt	14.5 × 10 ⁴ /mm ³	Na	139 meq/l
		K	3.4 meq/l
		Cl	105 meq/l
		Ca	9.0 meq/l
Blood Chemistry		S-Amy	769 IU/l
TP	7.7 g/dl	U-Amy	4001 IU/l
Alb	3.5 g/dl	HbA1	10.8%
T. Bil	0.6 mg/dl	HbA1c	8.3%
D. Bil	0.2 mg/dl		

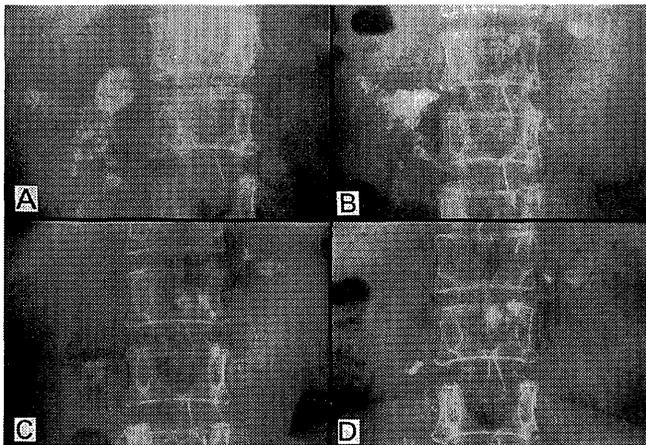


Fig. 5. Plain abdominal X-rays in case 2.

A ; at the time of admission.

Calcifications are evident at the head of the pancreas and, in smaller amounts, at the tail of the pancreas.

B ; after the first ESWL.

The quantity of stones diminished by about two-thirds compared with those before ESWL.

C ; just after completing the third ESWL.

The stones were further decreased but a few remained in the head of the pancreas.

D ; 7 days later the third ESWL.

The stones were completely eliminated from the head of the pancreas.

After the epigastralgia abated, ESWL was applied three times (5700 shock waves in total at a maximum output of 23 KV) to the stones at the head of the pancreas.

Just after the third ESWL, some stone fragments remained at the head of the pancreas (Fig. 5c). One week later, however, the stones were completely eliminated (Figs. 5d, 6). She has been well for 2 years after ESWL without abdominal pain.

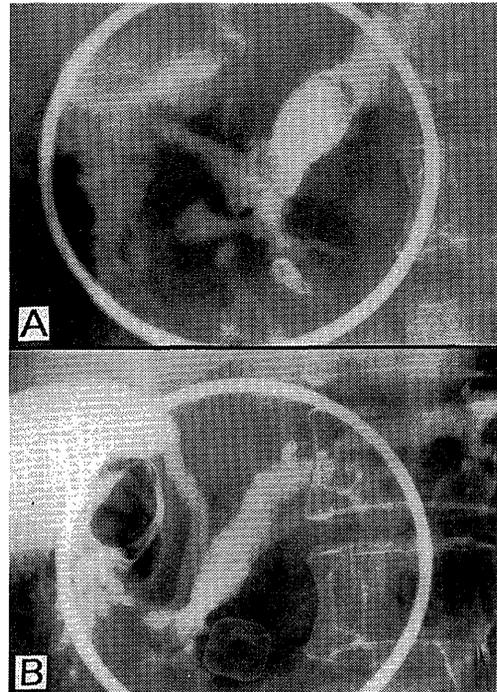


Fig. 6. The ERCP images before (A) and after ESWL (B) in case 2. The stones lodged in the main duct at the head of the pancreas before ESWL were not present and the main pancreatic duct became much less dilated after ESWL.

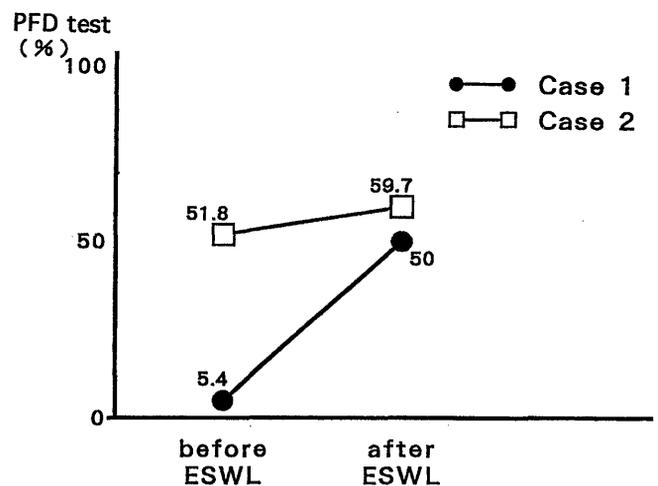


Fig. 7. Pancreatic exocrine function before and after ESWL.

Pancreatic exocrine function was examined by Pancreatic Function Diagnostant (PFD) test before and after ESWL. In case 1, a marked improvement from 5.4% before ESWL to 50% after ESWL was observed. In case 2, only slight improvement was seen from 51.8% to 59.7% (Fig. 7). Nevertheless, pancreatic endocrine function as evaluated by the 75 g glucose tolerance test remained unchanged in both cases.

Discussion

Surgical therapy has usually been employed in cases of pancreatolithiasis in order to relieve pancreatic pain or to preserve pancreatic endocrine and exocrine functions.

However, surgical therapy showed a decline after 1984 when Ammann et al.¹⁾ published results in Switzerland showing no difference in long-term prognosis between surgically treated and non-surgically treated groups. In recent years, non-surgical methods of treatment including litholysis²⁾ and EST^{3,4)} have been developed and clinically applied. However, these methods leave many problems to be solved: litholysis is not effective in removing stones and involves a long duration of treatment, and EST requires a high level of technical skill, especially for large calculi located in the main duct at the head of the pancreas.

In 1986, Sauerbruch et al.⁵⁾ reported ESWL as a non-surgical therapy for pancreatolithiasis which was performed in the patients with chronic pancreatitis and a dilated ductal system harboring stones 5 to 20 mm in diameter. In Europe and the United States, ESWL is generally used in combination with EST^{6,7)}; the stones are reduced to fragments by ESWL, then removed endoscopically by EST. The effectiveness of ESWL treatment without EST has also been reported^{8,9)}.

We herein report 2 patients with of pancreatolithiasis showing favorable response to ESWL. In case 1, pancreatic fistula was improved by ESWL, but recurrence resulted from the narrowing of the main duct at the head of the pancreas. In case 2, the stone fragments were spontaneously eliminated without the need for endoscopic procedure. Although EST was not employed in either case, pancreatic exocrine function was improved by ESWL alone without any complications. These results suggest that ESWL is efficacious.

We conclude that ESWL, like the endoscopic procedure, should be considered a high-priority non-surgical treatment for pancreatolithiasis.

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