

Extracorporeal shock – wave lithotripsy in the management of bile duct stones

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Extracorporeal shock – wave lithotripsy (ESWL) was undertaken in 16 patients with extra or intrahepatic bile duct stones which could not be removed endoscopically. Stone fragmentation was successful in 14 patients with stones in the biliary tract. Fragmentation failed in two patients with stones impacted in the papilla Vateri and had to be removed surgically. 14 of the 16 patients were free of stones after spontaneous passage (n = 9) or after endoscopic removal of the residual concretions (n = 5). Complications occurred in only three patients after ESWL (transitory hemobilia, transient hematuria). These data point to ESWL being clearly preferable to surgical intervention in bile duct stones refractory to endoscopic treatment, especially in the elderly with an increased perioperative risk.

Key words: cholelithiasis; lithotripsy

Introduction

The article by Sauerbuch et al. (1986), in which the authors describe their experience in Germany with the fragmentation of gallstones by means of extracorporeal shock waves (ESWL), generated a great deal of interest all over the world.¹⁻⁷ In our institution, most residual or primary bile duct stones after cholecystectomy are treated with basket extraction through an endoscopic sphincterotomy. These technique may fail if the stones are large (>2 cm) or if they are in an unfavorable location (e. g., in an intrahepatic duct or beyond a stricture). The endoscopic approach may be impossible when the normal anatomic relationship between the bile duct

and the duodenum is altered (e. g., periampullary diverticulum) or when the sphincter can not be reached because of previous gastrointestinal surgery.

Material and methods

Between October 1988 and March 1992 we used ESWL to treat 16 patients who had residual or primary bile duct stones after cholecystectomy. The patients were divided into two groups, 11 patients with residual bile duct stones and 5 patients with primary bile duct stones after cholecystectomy. In both groups, the indication for treatment was the failure of or anticipated difficulty with basket extraction of the stone. In five of these 16 patients, basket extraction via endoscopic sphincterotomy either had failed or had not been attempted because of the large size of stones (>20 mm in three

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patients) or the presence of an anatomic anomaly (periampullary diverticulum in two patients). Eleven patients had a T - tube in the bile duct, but basket extraction via an endoscopic sphincterotomy was impossible because the stones were in an unfavorable location (e. g., in an intrahepatic duct in six patients) or because of the large size of the stones (> 20 mm in three patients) or because of a previous gastrointestinal surgery (partial gastrectomy with Roux - en y anastomosis in two patients).

Baseline blood studies, including lactic dehydrogenase (LDH), aspartate transferase (AST), serum amylase, prothrombin time and partial thromboplastin time, and urinalysis were done less than 48 hr before ESWL and were repeated within 24 hr after the treatment. Abnormal tests were repeated until they returned to normal. Bile drainage was tested for blood. All patients had a coagulogram the day after the

treatment and at least one more cholangiogram before discharged or treated further.

The study group included thirteen women and three men (age range, 27-84 years). Most of the patients were more than 65 years old. The treatments were performed by using Siemens-Lythrotriptor equipment.

Results

All stones were fragmented successfully in 14 of the 16 patients. Fragmentation required one session in 12 patients, two sessions in one patient, four sessions in one patient. After ESWL, the stone fragments passed spontaneously in nine patients. In five patients the fragmented stones were removed by basket extraction through the endoscopic sphincterotomy. In two patients ESWL fragmentation failed and impacted stones in the papilla Vateri had to



Figure 1. ERC showing a gallstone in the common bile duct.

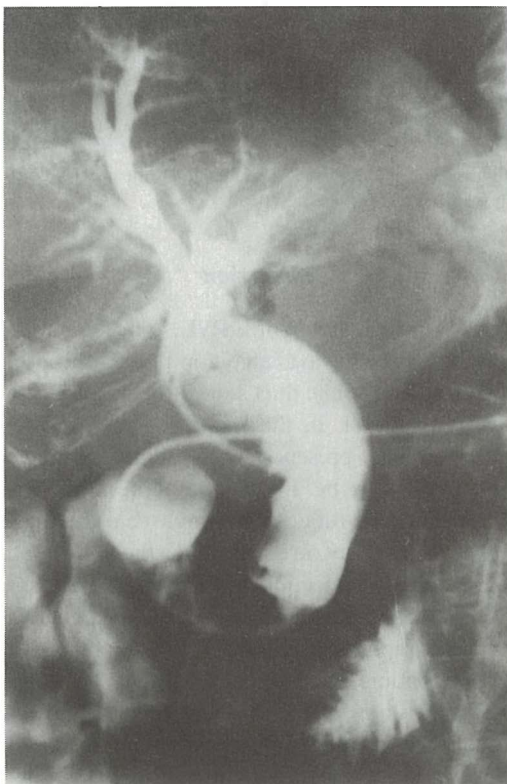


Figure 2. ERC after ESWL and spontaneous passage of fragments.

be removed surgically. The patients remained in the hospital from 2 to 14 days after the procedure, depending mainly on whether additional intervention was required. No clinically significant adverse reactions could be observed; in particular no evidence of pancreatitis was present. In two patients, transitory hemobilia developed. One patient had transient hematuria. Short – term elevations of LDS and AST were observed in most of the patients. Bruising of the skin was seen in four patients, but none had significant pain (Figure 1–4).

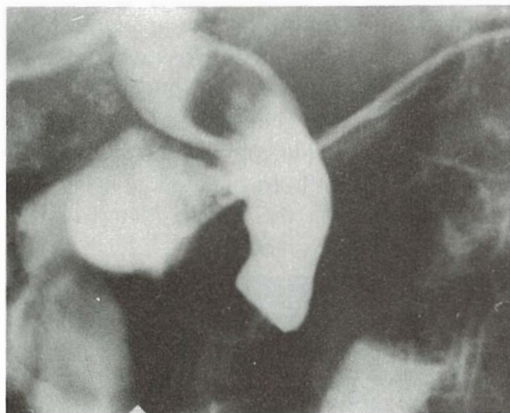


Figure 3. ERC showing a huge gallstone in the common bile duct.

Discussion

With the introduction of ESWL, another technique has become available for the nonsurgical management of bile duct stones.¹ A prerequisite for using ESWL in the treatment of bile duct stones is the presence of a biliary drainage tube. This may be a T – tube or a nasobiliary tube. Such a tube is indispensable because unless the stones are calcified, they must be visualized by injection of contrast material. Ductal stones rarely can be localized sufficiently by sonography.

The optimal or maximal number of shock waves has not yet been definitely established. Sauerbuch et. al. found that 500 – 1500 shocks were sufficient to fragment the stones. Other authors have reported the use of up to 3300 shocks.^{8,9} Our use of between 1500 and 3000

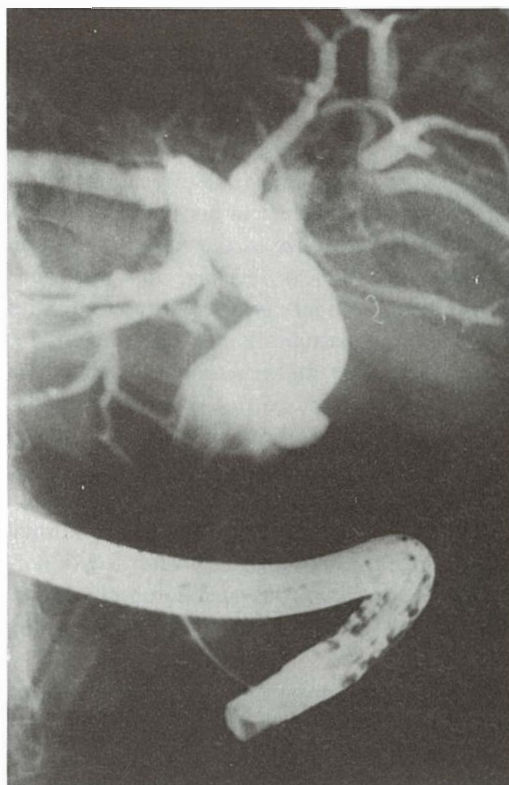


Figure 4. ERC after ESWL and extraction of fragments with Dormia basket.

shocks is therefore within the range of present practice. Pancreatitis, which has been described in the treatment of gallbladder stones, has not been reported in patients in whom the treatment was performed for retained common bile duct stones, possibly because of the presence indwelling drainage tube.

The lack of clinically significant adverse reactions to ESWL in our patients is in accordance with the data reported in the literature.^{10,11} However, the transient elevations of LDH and AST – indicating liver – cell damage – may be related to the higher – than average number of shock waves used. Our rate of successful fragmentation of stones (88 %) is about the same as that reported in the literature, the rate of spontaneous passage of fragments (56 %) is also about the same as that found in other centres.¹²⁻¹⁵

Conclusion

ESWL is a successful method for the management of patients with bile duct stones when used in conjunction with other nonsurgical techniques.

References

1. Sauerbruch T, Delins M, Paumgartner G, et. al. Fragmentation of gallstones by extracorporeal shock waves. *N Engl J Med* 1986; **314**: 818–22.
2. Mulley AG. Shock – wave lithotripsy: assessing a slam – bang technology. *N Engl J Med* 1986; **314**: 845–7.
3. Ferrucci JT. Biliary lithotripsy: what will the issues be? *A J R* 1987; **149**: 227–31.
4. Burthenne HJ. The promise of extracorporeal shock – wave lithotripsy for the treatment of gallstones. *A J R* 1987; **149**: 233–5.
5. Raskin JB. The continuing direct assault on the gallstone: enlightening, electrifying, and shocking. *Gastrointest Endosc* 1987; **33**: 262–3.
6. Nahrwold DL. Fragmentation of biliary tract stones by lithotripsy using local anesthesia. *Arch Surg* 1988; **123**: 91–3.
7. Van Sonnenberg E, Hofmann AF. Horizons in gallstone therapy – 1988. *A J R* 1988; **150**: 43–6.
8. Sauerbruch T, Stern M and the Study Group for Shock – wave Lithotripsy of Bile Duct Stones. Fragmentation of bile duct stones by extracorporeal shock waves. A new approach to biliary calculi after failure of routine endoscopic measures. *Gastroenterology* 1989; **96**: 146–52.
9. Brown BP, Loening SA, Johlin FC, Dayton MT, Maher JW. Fragmentation of biliary tract stones by lithotripsy using local anesthesia. *Arch Surg* 1988; **123**: 91–3.
10. Nicholson DA, Martin DF, Tweedle DEF, and Rao PN. Management of common bile duct stones using a second – generation extracorporeal shock-wave lithotripter. *B J Surg* 1992; **79**: 811–4.
11. Weber J, Adamek HE, Riemann JF. Extracorporeal piezoelectric lithotripsy for retained bile duct stones. *Endoscopy* 1992; **24**: 239–43.
12. Staritz M, Grosse A, Alkier R, Krzaska B und Meyer zum Buschenfelde KH. Therapie der Cholelithiasis durch extrakorporale Stosswellenlithotripsie und adjuvante operative. *Endoskopie. Z Gastroenterol* 1992; **30**: 156–61.
13. Binmoeller KF, Bruckner M, Thonke F, Soehendra N. Treatment of difficult bile duct stones using mechanical, electrohydraulic and extracorporeal shock wave lithotripsy. *Endoscopy* 1993; **25**: 201–6.
14. Lindstrom E, Borch K, Kullman EP, Tiselius HG, Ihse I. Extracorporeal shock wave lithotripsy of bile duct stones: a single institution experience. *Gut* 1992; **33**: 1416–20.
15. Adamek HE, Buttmann A, Hartmann CM, Jakobs R und Riemann F. Extracorporeal piezoelektrische lithotripsie von intra- und extrahepatischen Gallengangssteinen. *Dtsch Med Wschr* 1993; **118**: 1053–9.