that interval cholecystectomy can be performed subsequently in at least some of these patients. Chemical sclerosis of the gallbladder, although feasible, must still be regarded as experimental [7]. Certain requirements are needed before this procedure can be introduced in clinical practice. These include the development of safe sclerosant compounds with a high LD₅₀ (lethal dose for 50% of patients), a fool-proof method of cystic duct occlusion and prevention of the regeneration of gallbladder mucosa from the cystic duct.

References


Extracorporeal shockwave lithotripsy of gallstones and the importance of operative cholangiography during laparoscopic cholecystectomy

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Summary. Our institute participated in a national study. We had 68 patients (two-thirds had solitary and one-third multiple gallstone calculi). Our extracorporeal lithotripsy
results at 9–18 months’ follow-up showed 25% to be free of stone (fragment). Forty-four percent required a second session. This technique has limitations and needs further improvement in the aiming devices available and the size of fragments in order to be useful to a larger group of patients. Laparoscopic cholecystectomy is a new modality for endoscopic removal of the stone-filled gallbladder. It can be performed safely in a well-selected group of elective cases. It represents a final cure because the diseased stone-containing gallbladder is removed. Patients have distinct advantages: less postoperative pain, a short hospital stay, and early return to work. Intraoperative cholangiography is of help to define the anatomy. Surgeons need to be competent in laparoscopy before using this technique to perform endoscopic cholecystectomy. It will play a dominant role in the future treatment of symptomatic cholelithiasis.

**Key words:** Lithotripsy – Gallstones – Cholangiography – Laparoscopic surgery – Cholecystectomy

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**Extracorporeal shockwave lithotripsy**

Kidney lithotripsy was introduced a decade ago and proved to be extremely useful in the treatment of renal stone disease. Today, approximately 95% of patients in this particular group escape surgery. This technique was later extended to stones in the upper and mid-ureter, with great success. The first units consisted of a water bath in which the patient was immersed after epidural anesthesia. Using a spark-gap system, shockwaves were generated. Water was used as a transmitting agent and, with the aid of two image amplifiers and X-ray tubes, the radio-opaque stone was fluoroscopically centered and the shockwave, released. This lithotripsy technique for kidney and ureter stones is currently accepted worldwide.

**Fragmentation of gallstones**

It was logical that the same idea should be considered for the fragmentation of gallstones [7]. The units were improved and instead of a water bath, a column of water (tube with a membrane) was placed on the skin of the patient above the target area. Various shockwave generators are available with different systems: the traditional spark gap, the electromagnetic unit, and the piezo-electric system. One of the great drawbacks of the biliary lithotriptor unit is that fluoroscopy cannot be used with radiolucent stones; therefore, it had to be replaced by ultrasound for localization of the calculus. This, of course, caused several problems. The resolution of any current ultrasound system is inferior to a high-resolution fluoroscopic system. Positioning of the patient as well as the body habitus, colon gas, or duodenum proximity can interfere with this type of aiming device.

Our institution participated in a national study (ten hospitals) using the MPL 9000 spark-gap generator shockwave unit made by Dornier. Solitary and multiple stones not exceeding 30 mm in size and calculi with a small calcified rim were accepted. A prerequisite was that the gallbladder should be seen (excretion) on the oral cholecystogram because of the need for a patent cystic duct, as the fragments must pass through the cystic duct into the common bile duct. The procedure was performed on fasted patients with mild intravenous sedation. Very obese patients (>250 lb) were excluded as well as those with co-existent common bile duct stones, previous or present jaundice, allergy to iodine compounds, pregnancy, severe underlying disease, acute or sub-acute disease, and biliary pancreatitis, among other disorders. Patients were hospitalized 1 day after the procedure.

In this blind prospective study, every second patient was placed on adjuvant therapy (ursodeoxycholic acid) or placebo. At Cedars-Sinai Medical Center, we treated a total of 68 patients (the total number from the 10 institutions involved was 600), of whom 32 were men and 48 were women; 66% of our patients had solitary stones and 34%, multiple stones. The number of patients who were stone (fragment)-free after 6 months was 10%, which increased to 25% after 9–18 months. Two patients required surgery and one underwent endoscopic papillotomy.

We gained the impression that the results in multiple stone cases were not very convincing. Extracorporeal shockwave lithotripsy (ESWL) should probably only be indicated for solitary calculi <20 mm in size without any calcification in the presence of a functioning gallbladder. Our policy was that when we discovered fragments measuring >5 mm, we repeated ESWL after 6 weeks; in our series this occurred in 44% of patients. One-third to two-thirds of cases complained of mild or severe pain, but the procedure was tolerated with analgesics. Jaundice did not develop except in one patient in whom dilatation of the common bile duct was followed by increase levels in the liver function tests. This patient underwent first an endoscopic papillotomy. Her symptoms reoccurred and she was therefore explored surgically. Our results do not confirm the data published by the Munich group [7].

Further improvements in technology, particularly in the aiming device (ultrasound) and fragmentation process, are required. One problem is that an “ultrasound shield effect” develops after several hundred shockwaves. This can be observed after sedimentation; therefore, fragments cannot be seen and remain in the gallbladder. There is a definite need for better or smaller fragmentation to avoid repeated sessions and to improve the passage of fragments. At this stage, ESWL is a safe treatment modality for a small, selected group of patients. The cost effectiveness must be questioned. A great drawback is the phenomenon of reformed stones, which can occur in 50% of patients within a period of 5 years if adjuvant dissolution therapy is not used for the rest of their lives [1, 4].

**The importance of intraoperative cholangiography during laparoscopic cholecystectomy**

Laparoscopic cholecystectomy is one of the most intriguing and controversial issues in the treatment of gallstones.