

## Liver fibrosis after extracorporeal shock-wave lithotripsy of gallbladder stones

### A case report

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**Abstract.** We encountered significant liver fibrosis in a healthy young patient undergoing laparoscopic cholecystectomy for symptomatic gallstone disease. Twelve months prior to cholecystectomy the patient underwent multiple extracorporeal shock-wave lithotripsy (ESWL) sessions with adjuvant oral bile-acid therapy.

Since the site of fibrosis corresponded clearly to the shock-wave transmission path, which was in accordance with animal studies, it was concluded that this liver fibrosis was a side effect of biliary ESWL.

Based on these findings and the literature, we conclude that further assessment of the long-term safety of ESWL is still warranted, especially in patients undergoing multiple ESWL sessions.

**Key words:** Gallstones — ESWL — Lithotripsy — Complications — Side effects — Liver — Fibrosis

Extracorporeal-shock-wave lithotripsy (ESWL) of symptomatic gallstones was introduced as a noninvasive alternative to the gold standard, cholecystectomy [16]. ESWL is considered safe and relatively effective in selected patients [1].

We report on a patient who underwent laparoscopic cholecystectomy for failure of dissolution therapy after successful ESWL. At operation she appeared to have developed liver fibrosis, most probably caused by lithotripsy.

### Case report

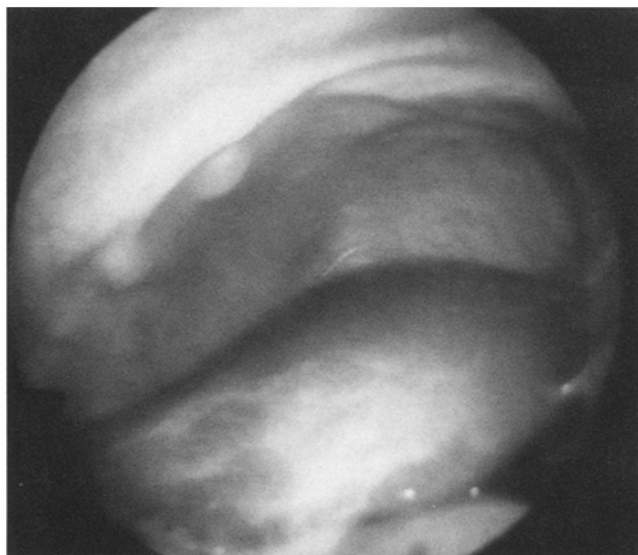
A healthy young woman, aged 42, underwent laparoscopic cholecystectomy for uncomplicated symptomatic gallstone disease. At laparoscopy, the liver surface was found to be partly fibrous (Fig. 1), while the gallbladder had a normal appearance (not shown). Laparoscopic cholecystectomy was uneventful, and after 1 month, the patient is free of symptoms. The normal aspect of the gallbladder was histologically confirmed.

Twelve months prior to cholecystectomy, the patient had undergone ESWL with the Lithostar Plus (Siemens AG, Erlangen, Germany), a second-generation lithotripter which works on the electromagnetic principle. Shock-wave therapy consisted of five ESWL sessions with a total of 16,000 shock waves at a median energy level of 6.5. The patient underwent laparoscopic cholecystectomy because adjuvant bile-acid treatment (500 mg ursodeoxycholic acid and 250 mg chenodeoxycholic acid daily, taken orally as one bedtime dose) did not dissolve the residual stones. The shock-wave therapy was considered successful since the solitary radiolucent stone of 24 mm disintegrated into multiple fragments no larger than 4 mm. During ESWL treatment and bile-acid therapy, there were no serologic or ultrasonographic indications for liver damage.

### Discussion

Cholecystectomy is the standard procedure for symptomatic gallstones [12]. For patients rejecting operation and patients with high operative risks, ESWL may form an attractive alternative, since it is accompanied by minimal morbidity.

Shock waves alone are thought to be safe [1, 2, 4], and the few significant side effects of ESWL are considered to result only from either residual stones or passing fragments [1]. Still, several investigators found considerable macroscopic and microscopic damage in *in vivo* animal experiments to tissues adjacent to the gallbladder such as the liver [6, 7, 13, 19]. But since it was found that acute histologic effects on the liver may occur without long-term histologic effects, it was sug-



**Fig. 1.** Large fibrotic plaque on the liver surface seen at laparoscopic cholecystectomy. Prior to cholecystectomy, the patient underwent five sessions of extracorporeal-shock-wave lithotripsy. The fibrotic scar, clearly corresponds to the shock-wave transmission path.

gested that these effects might be transient [5, 8, 14, 15]. So, if the liver were to be affected by biliary ESWL at all, these changes were considered to be of no clinical importance [3] and, therefore, not a contraindication to applying shock waves for gallstone destruction in man [6, 8].

In fact, most clinical studies revealed that ESWL had little effect on the liver. In relatively large series of patients routinely screened for liver abnormalities, no effects could be demonstrated, either by ultrasound [18] or computed tomography [10]. Also, patients who were subjected to ESWL immediately prior to cholecystectomy were found to have no acute liver damage, although other soft tissues such as the duodenum and stomach were affected [3]. McGrath and co-workers found one subcapsular hematoma in 250 patients [11]. In one of the largest patient series ( $n = 711$ ), only one liver hematoma was found [17]. It should be noted that the latter was found at cholecystectomy (1 week after the last ESWL session) and had not been identified by ultrasonography, although it was 5 cm large. This probably implies that routine radiologic examination is not sensitive enough to detect liver abnormalities after ESWL, which is also the case for liver function tests [9].

To our knowledge, no long-term side effects in patients have been published. The prevalence of long-term effects is in fact unknown. We now identified one patient in 133 patients treated with ESWL in our hospital. It should be noted that only 30 of them were cholecystectomized, so if ultrasound should be insensitive in detecting gross liver fibrosis caused by ESWL, the prevalence may be in fact higher. This is in accordance with animal studies performed in our hospital, where liver fibrosis ("scarring") has been described in four of six animals [19]. In our case this

scarring clearly corresponded to the shock-wave transmission path. The presence of macroscopic abnormalities in the absence of significant rises of liver biochemical parameters in our patient has also been demonstrated in animal studies before [8].

## Conclusion

We found liver fibrosis in one patient operated on after biliary lithotripsy. Because the site of the liver fibrosis corresponded so clearly to the shock-wave transmission path, it was concluded that the liver fibrosis was a complication of ESWL. The liver fibrosis did not cause any clinical or biochemical abnormalities. The clinical relevance of this complication is, therefore, still unknown.

Since the reported liver fibrosis was repeatedly not recorded by routine ultrasonography, it is likely that the prevalence of this complication may be higher than previously thought. Further assessment of the safety of ESWL is, therefore, still warranted. In particular, information on the long-term effects on adjacent tissues is needed in patients undergoing multiple ESWL-sessions for gallbladder stones.

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