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LETTER TO THE EDITOR

Hepatic haematoma after shockwave lithotripsy for renal stones

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Abstract Extracorporeal shock wave lithotripsy (SWL) is a non-invasive procedure for urolithiasis. Only a very small portion of patients suffer from post-SWL haematoma and most of them have perinephric haematoma formation. We present two patients who developed subcapsular hepatic haematomas after SWL, followed by a review of the literature on the condition.

Keywords Extracorporeal shock wave lithotripsy · Hepatic haematoma · Urolithiasis · Complication

Introduction

Extracorporeal shock wave lithotripsy (SWL) has revolutionized the management of urinary stones since its first clinical application with successful fragmentation of renal calculi in Germany in 1980. It is considered to be a non-invasive and low morbidity procedure. It is particularly useful in treating renal stones, with an average stone-free rate >70 % [1]. However, despite its minimal invasiveness, it does have complications. Fortunately, most of the common complications, including pain, urinary tract infection, haematuria, etc., are self-limiting and not life-threatening. Post-SWL hepatic subcapsular haematoma is a very rare complication, with only a dozen cases reported in the literature (Table 1) [2–10]. Here, we present two cases of post-SWL hepatic subcapsular haematoma that occurred in our region.

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First case

A slightly built 51-year-old woman, with a history of laparoscopic right ovarian cystectomy and bilateral tubal ligation, first presented with right-sided loin pain. Plain radiography suggested a 1 cm right-lower caliceal stone and a 1.5 cm right pelviureteric (PUJ) stone, which were confirmed by non-contrast computerized tomogram (NCCT) scan. The patient's clotting profile and platelet count were normal. A right ureteroscopy was performed and the two stones were fragmented by Holmium Laser. A double-J ureteric stent was inserted at the end of the procedure. Post-treatment radiography showed a residual 7 mm right-lower caliceal stone. Therefore, SWL was performed with a Dornier MedTech Lithotripter S under fluoroscopic guidance 6 weeks after the ureteroscopy. The treatment was performed at 2 Hz with a maximum power of 15.7 kV. However, the patient experienced nausea and vomiting and severe epigastric pain, and the procedure was terminated after 1,833 shocks. Because of her symptoms, she was admitted for observation. She remained afebrile and her vital signs were stable. There was no peritoneal sign. The initial post-SWL blood tests were normal, except for a slight drop in haemoglobin, from 12.3 to 11.2 g/dL. Ultrasonography of the kidneys did not show any perinephretic haematoma.

However, about 27 h after the SWL, she complained of severe abdominal pain. Physical examination revealed

Table 1 Summary of the literature for patients suffered post-SWL hepatic haematoma

Reporting author	Age	Sex	Stone site	Stone size (mm)	Lithotriptor	Total number of shock	Maximum power	Time of presentation	Symptom	CT finding	Management	Outcome
AUA panel [2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rossi [3]	NA	NA	NA	NA	NA	NA	NA	NA	RUQ pain	NA	Conservative management	Resolved haematoma
Matsushita [4]	60	M	NA	NA	NA	NA	NA	NA	NA	NA	Conservative management	Resolved haematoma
Harda [4]	25	M	UU	NA	NA	NA	NA	NA	NA	NA	Angiographic embolization	–
Meyer and Cass [2]	69	M	MC	4	Medstone STS	1,600	24 kV	3 weeks	Persistent RUQ pain	Haematoma but no evidence of active bleeding	Percutaneous drainage to rule out amoebic abscess	Resolved haematoma
Padilla et al. [3]	42	M	UC	15	Dornier MPL 5000	2,800	23–26 kV	Day 3	RUQ pain	Hepatic haematoma	Conservative management	Resolved haematoma
Kobayashi et al. [4]	63	F	UC	6	Sonolith 3000	2,800	14 kV	Day 1	Diagnosed by post-treatment ultrasound study	Hepatic haematoma	Conservative management	Resolved haematoma
Bogdanovic et al. [5]	30	F	NA	NA	Simens Lithostar 2000	3,000	16 kV	Day 2	Abdominal pain with shock	Haematoma with focal parenchymal haemorrhage and peritoneal fluid collection	Laparotomy and ligation of right hepatic artery	Resolved haematoma
Neto et al. [6]	35	F	MC	7	Dornier Compact-S	5,500/ 2,500 (two sections)	Level 6 energy	2 months after second SWL	Persistent RUQ pain and then fever	6 cm hepatic abscess (infected haematoma)	Percutaneous drainage	Resolved haematoma
Beatrice et al. [7]	37	F	MC	NA	Dornier MedTech DL-50	3,000	16 kV	Day 2	RUQ pain with shock	Haematoma with active contrast extravasations	Angiographic embolization	Resolved haematoma
Gordetsky et al. [8]	71	F	UPJ	9	Dornier MedTech Doli 120	2,500	18 kV	Immediately	Progressive right-sided abdominal pain	Expanding haematoma in follow-up CT leading to hepatic vein thrombosis	Hand-assisted laparoscopic evaculation of blood clot (for decompression) and argon bean coagulation of liver surface	Resolved haematoma
Lin and Hwang [9]	51	M	LC	6	Simens Lithostart II	3,000	15.3 kV	Day 2	RUQ pain with shock	Hepatic haematoma	Laparotomy and haemostasis	–
Kim et al. [10]	43	F	UC	9	Direx Compact XL	3,200	18 kV	Day 1	Abdominal pain	Hepatic haematoma with no active bleeding	Conservative management	Resolved haematoma

Table 1 continued

Reporting author	Age	Sex	Stone site	Stone size (mm)	Lithotriptor	Total number of shock	Maximum power	Time of presentation	Symptom	CT finding	Management	Outcome
Current case 1	51	F	LC	7	Dornier MedTech Lithotripter S	1,833	15.7 kV	Day 1	Progressive abdominal pain	Hepatic haematoma with contrast extravasation and haemoperitoneum	Angiographic embolization	Resolved haematoma
Current case 2	36	F	UC	16	Sonolith Vision	3,368	14.4 kV	Day 1	Epigastric pain	Hepatic haematoma with contrast extravasations	Attempted angiographic embolization	Resolved haematoma

M male, *F* female, *UC* upper caliceal stone, *MC* mid-caliceal stone, *LC* lower caliceal stone, *UPJ* ureteropelvic junction stone, *RUQ* right-upper quadrant, *NA* information not available

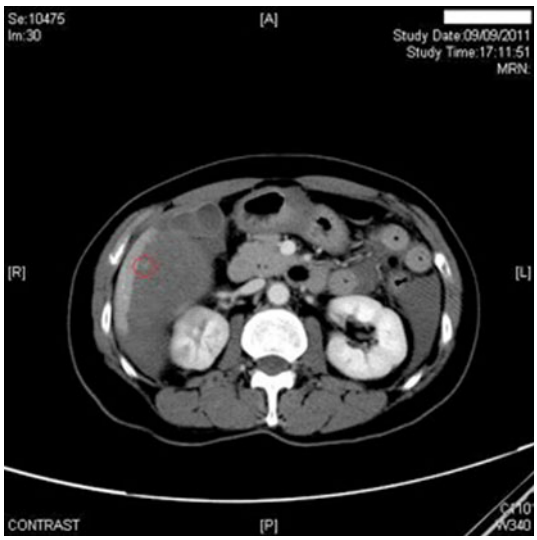

Fig. 1 Subcapsular hepatic haematoma over the inferomedial aspect of the right lobe, with evidence of active bleeding near the tip of the inferior right lobe of the liver (*red circle*)

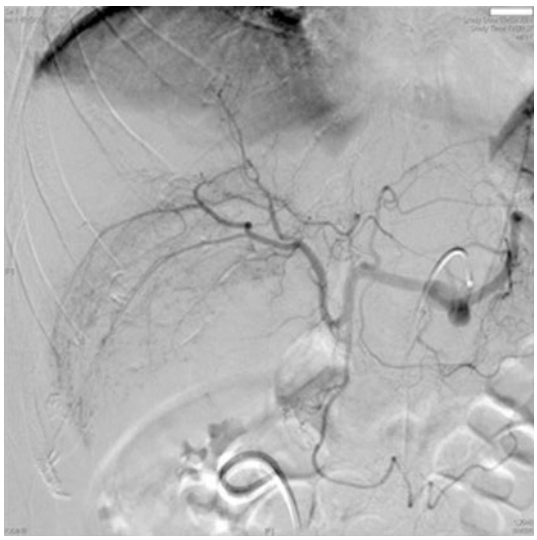

Fig. 2 Diffuse nodular staining during the arterial phase of the right-inferior lobe of the liver, mainly from segment 5 and segment 6 arteries, suggestive of active bleeding

generalized abdominal pain with peritoneal signs over the right-upper quadrant. A contrast CT scan revealed a large subcapsular hepatic haematoma (8.6 cm × 5.8 cm × 4.2 cm) over the inferomedial aspect of the right hepatic lobe, with evidence of contrast extravasation (Fig. 1). There was also a diffuse haemoperitoneum and a small subcapsular haematoma (1.2 cm × 2.0 cm × 1.8 cm) over the upper pole of the right kidney. A repeat blood test showed a further drop in haemoglobin from 11.2 to 9 g/dL. Emergency angiographic embolization was decided. During the

procedure, diffuse nodular staining during the arterial phase (Fig. 2) of the right-inferior lobe of the liver was noticed, which suggested the presence of active bleeding. Embolization of the bleeding vessels was achieved by Gelfoam injection. The patient was stabilized and discharged 7 days after embolization. Follow-up imaging performed 2 months after the SWL showed a resolving haematoma.

Second case

A 34-year-old woman, who had previously enjoyed good health, presented with an incidental finding of bilateral staghorn stones. The differential function in both kidneys was equal. Right percutaneous nephrolithotomy (PCNL) was first performed with a lower pole puncture. During the surgery, there was some difficulty in assessing the upper calices, thus a double-J ureteric stent was inserted and subsequent SWL treatment was planned. The SWL was arranged 8 weeks after the PCNL; the pre-SWL radiography revealed several upper caliceal fragments (the largest around 16 mm). Treatment was performed at 2 Hz with maximum power of 14.4 kV for total 3,368 shocks. The treatment was uneventful and the post-treatment film revealed good stone fragmentation. The patient was discharged after observation for 1 h and further SWL was planned in a 3 weeks time.

However, she was admitted to the hospital around 24 h later due to increasing epigastric pain. Though she was haemodynamically stable, there was a drop in haemoglobin level from 11.3 to 9.8 g/dL. An urgent CT scan revealed a huge right hepatic haematoma (18 × 15 × 8.6 cm) with evidence of active contrast extravasations. There was also some fluid in the pelvis and Morrison pouch, suggestive of haemoperitoneum. Angiographic embolization was initially decided; however, there was no sign of active extravasations during an angiographic study and so embolization was not performed. The patient's condition gradually improved with conservative management and she was discharged 8 days after admission. Follow-up imaging performed at 2 weeks, 4 months and 1 year showed a gradually resolving haematoma.

Discussion

Hepatic haematoma after SWL to renal stones is a rare complication, with only 13 cases reported worldwide [2–10]. The first case was described in the summary report on the safety and clinical effectiveness of lithotripsy by the American Urological Association in 1984; however, details of the case are not available in the literature [2]. A summary of the clinical information on the other cases is listed in Table 1. According to Meyer and Cass [2], no hepatic haematoma was detected by imaging in more than 400 patients treated with SWL for urinary calculi. Hypertension, clotting disorders, previous history of ESWL, advanced age (>60 years), diabetes mellitus, generalized arteriosclerosis, coronary artery disease, obesity and small kidneys are proposed as significant risk factors for post-ESWL perinephretic haematoma formation [11–13]. However, there seems to be no particular patient or stone factors related to the development of hepatic haematoma, except that all of the targeted renal stones were on the right side. Three patients had a ureteral stent in situ (two of which were our cases) [8]. Nor does there seem to be a relationship with the type of machine used, or the energy and power settings for the treatment.

The majority of patients presented with right-sided abdominal pain in the first 2 days after SWL. Some patients also developed shock on presentation [5, 7, 9]. However, two patients presented with persistent right-upper quadrant pain after SWL and were diagnosed a few weeks later [2, 6]. Diagnosis was usually made by computerized tomogram, which provided not only the diagnosis but also other findings, such as active contrast extravasation, haemoperitoneum, or even hepatic vein thrombosis [8].

There is no consensus over the management of post-SWL hepatic haematoma. The choice of management includes conservative management, angiographic embolization, laparoscopic drainage, and laparotomy. The main indications for non-conservative management include clinical shock, evidence of active bleeding in CT (our cases), and expanding haematoma in follow-up scans [7]. As the liver is an intraperitoneal organ and also lacks a tough fascia (compared to the kidneys), the incidence of patients requiring interventional management is higher than those suffering from post-SWL renal haematoma. Fortunately, no mortalities have been reported and most of the haematomas resolved on subsequent follow-up imaging.

In conclusion, although SWL is a relatively safe and non-invasive treatment for urolithiasis, serious complications such as hepatic haematoma may still occur. The differential diagnosis of hepatic haematoma should be considered for patients who develop severe right-sided abdominal pain after right-sided renal SWL.

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