

Case Report

Life-Threatening Complication after Extracorporeal Shock Wave Lithotripsy for a Renal Stone: A Hepatic Subcapsular Hematoma

Tae-Beom Kim, Ho-Ki Park, Kwang-Yeom Lee, Khae-Hawn Kim, Han Jung, Sang-Jin Yoon

Department of Urology, Gachon University Gil Hospital, Incheon, Korea

Extracorporeal shock wave lithotripsy (ESWL) has revolutionized the management of urolithiasis since it was first introduced in 1980. ESWL is a well-established, safe and effective therapeutic alternative to surgical treatment for urolithiasis. Complications of ESWL do occur in a small number of patients, and when they do, they typically involve the kidney. We present a case of a young female patient who developed a huge hepatic subcapsular hematoma accompanied by hypovolemic shock after ESWL for a 9 mm stone in the right kidney. The hematoma measured 13x6 cm. Conservative care with no surgical intervention was chosen because there was no evidence of active bleeding on the computed tomography. After conservative therapy, the hematoma was gradually absorbed and the patient was discharged.

Key Words: Lithotripsy; Hematoma; Complications

Article History:

received 3 February, 2010
accepted 22 February, 2010

Corresponding Author:

Khae-Hawn Kim
Department of Urology, Gachon
University Gil Hospital, 1198,
Guwol-dong, Namdong-gu, Incheon
405-760, Korea
TEL: +82-32-460-3331
FAX: +82-32-460-8340
E-mail: kimcho99@gilhospital.com

Extracorporeal shock wave lithotripsy (ESWL) has been widely used for the treatment of urolithiasis since it was first introduced in 1980 [1]. Lithotripsy attempts to break up the stone with minimal collateral damage through the use of an externally applied, focused, and high-intensity acoustic pulse. The successive shock wave pressure pulse results in direct shearing forces, as well as cavitation bubbles surrounding the stone, and this fragments the stones into smaller pieces that can then easily pass through the ureter. Because it is a noninvasive and safe treatment, complications of ESWL occur in only 3% to 7% of the patients who undergo this procedure; the complications are usually mild, and life-threatening complications are extremely rare [2]. The incidence of clinically significant hematoma formation after ESWL is reported in less than 1% of the cases in the literature [3,4]. Moreover, hepatic hematoma after ESWL is extremely rare [5-7]. We report here the case of a patient with a hepatic subcapsular hematoma after ESWL. The patient was successfully treated with supportive care.

CASE REPORT

A 43-year-old woman with right flank pain visited our urology department. She had no significant medical history or history of trauma. We performed intravenous pyelography (IVP), laboratory studies, and urinalysis. The laboratory

studies and urinalysis were normal except for the presence of microscopic hematuria (hemoglobin level: 12.9 g/dl). On IVP, we found a 9 mm stone in the right kidney and no hydronephrosis or renal/ureteral calculous obstruction (Fig. 1). We recommended ESWL, but she wanted to go to another clinic for private reasons. A week later, she underwent ESWL for a right renal stone at the other local clinic with the Compact XL model lithotripter (Direx, Israel). A total of 3,200 shocks were delivered at a maximum power of 18 kV and a rate of 80 shocks per minute. The abdominal pain was aggravated after ESWL, so she was prescribed only medication for pain control without radiologic or laboratory examinations. But her abdominal pain persisted and became much worse. Finally, she was referred to our emergency room 12 hours later.

The examination showed a patient in acute distress with a tired appearance. Her oral temperature was 36.8°C, her blood pressure was 90/60 mmHg, her pulse was 96 beats/minute, and her respiration rate was 24 times per minute. The mucus membranes were slightly dry, the chest was clear, and the cardiac examination was unremarkable. A Foley catheter was inserted in the ER. The urine drainage was good and the urine color was amber.

The initial laboratory data in the ER showed the following: a hemoglobin level of 5.4 g/dl, a hematocrit of 15.4%, a BUN level of 12.2 mg/dl, a creatinine level of 0.9 mg/dl, and a platelet count of 101×10^3 /ml. The prothrombin time

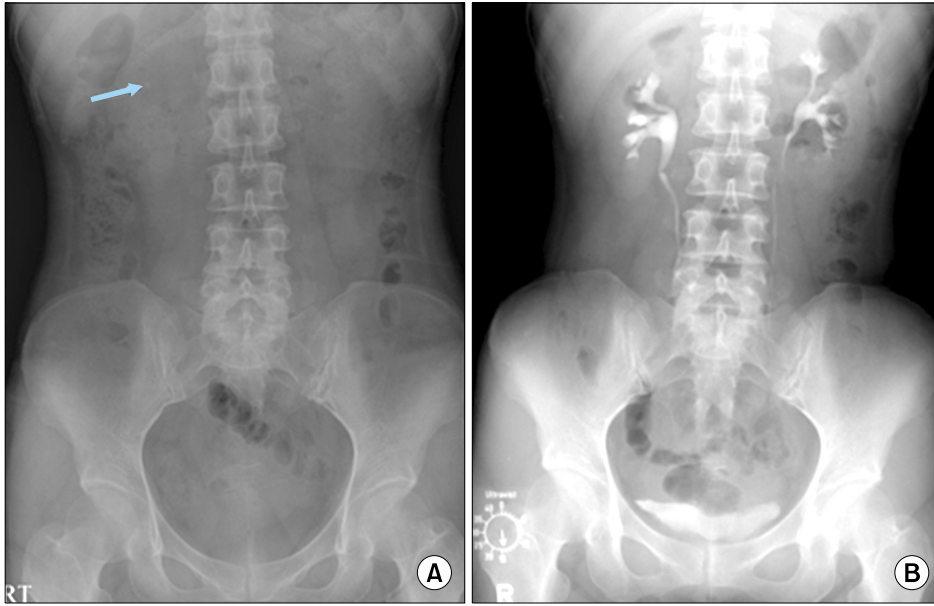


FIG. 1. (A) Before extracorporeal shock wave lithotripsy (ESWL), the kidney, ureter, and bladder radiography (KUB) revealed a 9 mm renal stone in the right kidney (arrow). (B) Before ESWL, the intravenous pyelography (IVP) revealed no hydronephrosis or excretion abnormality.

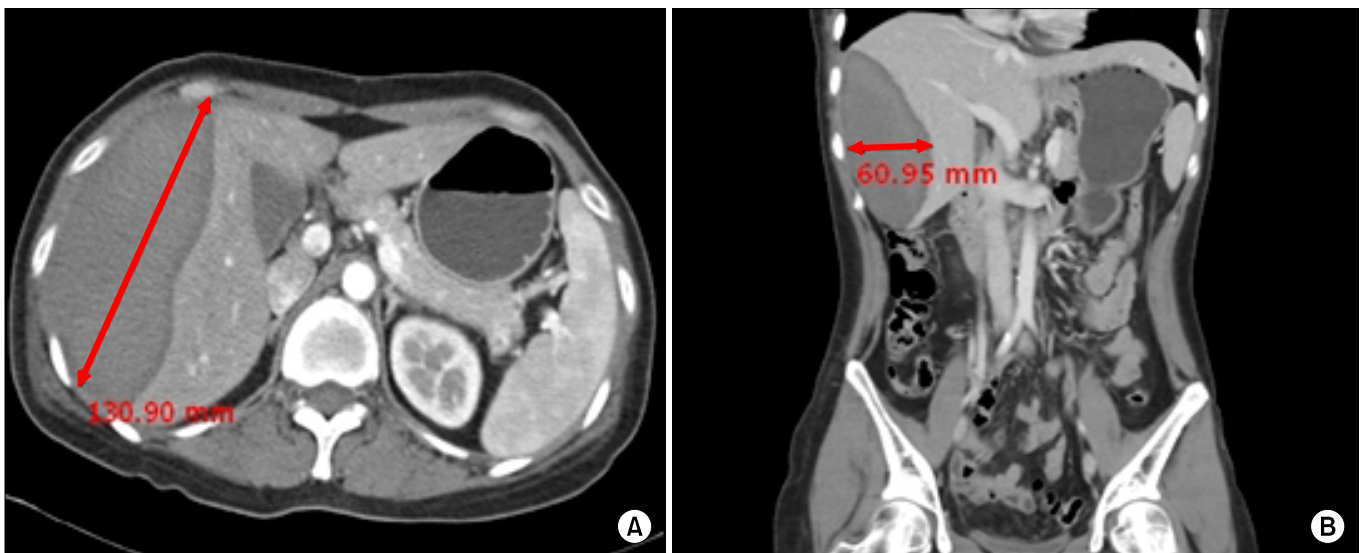


FIG. 2. (A) The axial and (B) vertical images of the computed tomography (CT) showing a large (13x6 cm) subcapsular hepatic hematoma.

and actuated partial prothrombin times were 13.7 and 30.6 s, respectively, and aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels were 145 and 135 IU/l, respectively. Urinalysis revealed occult blood 2+ and 20-25 erythrocytes per high power field.

The pain continued despite pain relief treatment and the hemoglobin level was low, so we performed a CT scan of the abdomen. The CT scan of the abdomen revealed a 13x6 cm subcapsular hematoma of the liver that was compressing the right liver lobe (Fig. 2). The CT scan revealed no findings suspicious of active bleeding in the liver.

A transfusion was started quickly and the patient's vital signs were stabilized after fluid resuscitation and transfusion. Thus, we decided to treat the patient with suppor-

tive care and we transferred her to the intensive care unit (ICU) due to her need for strict blood pressure control and the risk of delayed bleeding.

After several days of conservative therapy, the patient's serial transaminase tests became somewhat normal and her hematocrit and hemoglobin level remained stable. A follow-up CT scan of the abdomen also showed that the hematoma had decreased in size (Fig. 3A). The patient was discharged from the hospital after 60 days without complications. On the follow-up examination 3 months after discharge, a remarkable reduction of the hematoma was seen on a CT scan (Fig. 3B).

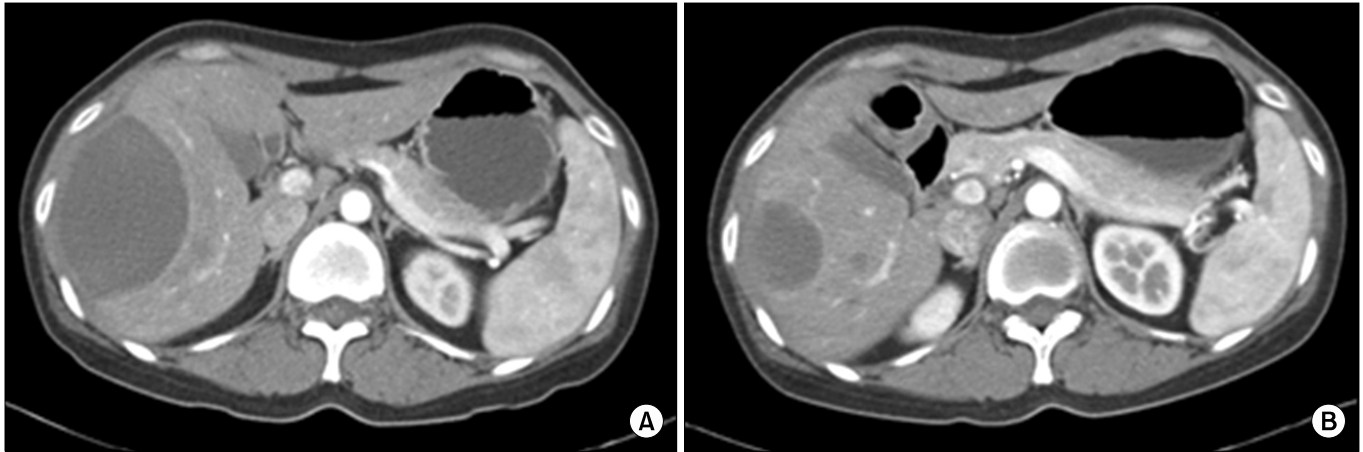


FIG. 3. (A) Two months after extracorporeal shock wave lithotripsy (ESWL), the CT scan revealed a decreased size of the subcapsular hepatic hematoma. (B) Five months after ESWL, the subcapsular hematoma had been markedly resorbed and presented in a resolving state.

DISCUSSION

ESWL has been reported to have a low complication rate and a low mortality rate. Most of the complications include transient gross hematuria, flank pain, and urinary tract infection that can usually be treated with conservative management. However, several case reports of complications that required transfusion or surgical treatment have been published during the past years. These complications include kidney rupture, psoas abscess formation, subcapsular hematoma of the spleen, and hemorrhage. These complications are thought to be the result of cell damage caused by the cavitation and attending shear forces produced by the shock waves as they pass through the cell mass.

The most common hemorrhage is perinephric hematoma, and the incidence rate of this is between 0.28% and 4.1% [8]. Subcapsular hepatic hematoma is a rarer complication. Only seven cases of hepatic subcapsular hematoma after ESWL for a right renal stone have been reported to date [5-7]. The outcome of one patient is unknown, two patients were treated conservatively, one patient was treated by percutaneous drainage because the condition was misdiagnosed as liver abscess caused by amebas, two patients were treated with transarterial embolization, and one patient was treated with surgical intervention (capsulectomy) because of persistent abdominal pain and a rising liver transaminase level. Our patient was treated conservatively.

The mechanism of subcapsular hematoma formation is related to the difference in impedance between the liver capsule and the parenchyma. Another important mechanism is the piercing effect of a liquid microjet with an impact velocity of more than 200 m/s, which occurs through the interaction of the tiny bubbles and the shock wave [9]. Once the hemorrhage occurs, the weight of the blood clot cuts the vessel between the liver parenchyma and the

capsule. Thus, the hematoma increases.

Hypertension, clotting disorders, a previous history of ESWL, an advanced age (>60 years), diabetes mellitus, generalized arteriosclerosis, coronary artery diseases, and obesity have all been proposed as significant risk factors for perinephric or subcapsular hepatic hematomas [10]. The most prevalent risk factor is hypertension. The atherosclerosis of the vasculature caused by hypertension is associated with loss of tensile strength of the vascular walls. This makes the vessel walls more vulnerable to the trauma of high-energy shock waves [3]. Our patient, however, did not have a previous history of hypertension, known liver pathology, or coagulopathy. She denied the use of any anti-coagulant medications.

Patients with hematoma frequently present with clinical symptoms such as pain, mild fever, and syncope. Hematoma should be suspected in cases where the pain persists despite administration of analgesics or in cases with findings that are suspicious for hypovolemic shock, such as syncope, orthostatic hypotension, and a decreased hemoglobin level. Our patient presented with abdominal pain, but in the local clinic, this pain was mistaken for colic pain that was caused by passing a stone fragment. She was therefore prescribed only medication for pain control, but the pain was not affected by the analgesics. After she was referred to our ER, we observed that she had a severely decreased hemoglobin level and low blood pressure, so she was suspected to have hypovolemic shock.

To diagnose the complications of hemorrhage, a CT scan, magnetic resonance imaging, angiography, or ultrasonography should be done after ESWL. CT scanning has recently been recommended for this. A CT scan of the abdomen should be done to rule out hemorrhage when persistent, unexplained pain occurs following ESWL. In our case, radiologic examination was not quickly carried out in the local clinic, but after she was referred to our hospital, we used a CT scan as a diagnostic tool and for the follow-up

examination.

Supportive care is the preferred treatment method for hematoma after ESWL. However, transfusion should be immediately started for cases in which signs of hypovolemic shock are observed or where the hemoglobin level is severely decreased. Embolization or surgical treatment should be considered for cases that do not respond to transfusion and supportive care, including watchful waiting or percutaneous drainage of the blood collection. To the best of our knowledge, only two cases of subcapsular hepatic hematoma in the literature were treated with surgical intervention (transarterial embolization [5,6] and capsulectomy [7]).

In our case, the persistent pain after ESWL was mistaken for colic pain, so the patient was prescribed only medication for pain control without radiologic or laboratory examinations at the local clinic. But the pain was not controlled by the analgesics.

In conclusion, when a patient presents with flank and abdominal pain that develops after ESWL, physicians should bear in mind the possibility of hemorrhage in addition to renal colic, and they should also closely observe the patient for clinical signs that are suggestive of hypovolemic shock. It is our opinion that all physicians dealing with ESWL should be aware of this unusual complication, even though it is rare.

Conflicts of Interest

The authors have nothing to disclose.

REFERENCES

1. Moon YT, Oh CH, Moon WC, Kim KD, Kim YS, Kim SC, et al. An experience with piezoelectric extracorporeal shock wave lithotripsy: 2000 cases. *Korean J Nephrol* 1991;10:166-74.
2. Donahue LA, Linke CA, Rowe JM. Renal loss following extracorporeal shock wave lithotripsy. *J Urol* 1989;142:809-11.
3. Kostakopoulos A, Stavropoulos NJ, Macrychoritis C, Deliveliotis C, Antonopoulos KP, Picramenos D. Subcapsular hematoma due to ESWL: risk factors. A study of 4,247 patients. *Urol Int* 1995;55:21-4.
4. Sherman SC, Dogon A. Subcapsular renal hematoma after shock wave lithotripsy. *J Emerg Med* 2006;30:437-9.
5. Beatrice J, Strebel RT, Pfammatter T, Röhwyder JH, Sulser T. Life-threatening complication after right renal extracorporeal shock wave lithotripsy: large hepatic haematoma requiring embolisation of the right hepatic artery. *Eur Urol* 2007;52:909-11.
6. Hirata N, Kushida Y, Ohguri T, Wakasugi S, Kojima T, Fujita R. Hepatic subcapsular hematoma after extracorporeal shock wave lithotripsy (ESWL) for pancreatic stones. *J Gastroenterol* 1999; 34:713-6.
7. Gordetsky J, Hislop S, Orloff M, Butler M, Erturk E. Subcapsular hepatic hematoma with right hepatic vein thrombosis: a complication of shock wave lithotripsy. *Can Urol Assoc J* 2008;2:61-3.
8. Klára T, Magdolna K. Fetal renal hemorrhage after extracorporeal shock wave lithotripsy. *J Forensic* 2008;53:1191-3.
9. Hirata N, Kushida Y, Ohguri T, Wakasugi S, Kojima T, Fujita R. Hepatic subcapsular hematoma after extracorporeal shock wave lithotripsy (ESWL) for pancreatic stones. *J Gastroenterol* 1999; 34:713-6.
10. Collado Serra A, Huguet Pérez J, Monreal García de Vicuña F, Rousaud Barón A, Izquierdo de la Torre F, Vicente Rodríguez J. Renal hematoma as a complication of extracorporeal shock wave lithotripsy. *Scand J Urol Nephrol* 1999;33:171-5.