Reminder of important clinical lesson

Hepatic cyst infection in a healthy older male

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Summary

Simple hepatic cysts are usually asymptomatic and are not associated with impaired hepatic function. However, complications, such as obstructive jaundice, rupture, intracystic haemorrhage and infection, can occur. The authors describe the case of a 82-year-old man with fever and elevated C-reactive protein. A repeat contrast-enhanced abdominal CT scan revealed enlargement with peripheral enhancement in the left lateral segment of the liver. A diagnosis of infected hepatic cyst was made, and percutaneous transhepatic drainage of the cyst was performed. When a patient has liver cysts and high-grade fever, liver cysts should be considered as a focus of infection. Repetition of ultrasonography and/or CT studies should be considered, even if no typical findings are obtained initially. It is of note that conventional Ga-scintigraphy may be useful for the detection of infected site.

BACKGROUND

Hepatic cysts are usually asymptomatic and are not associated with impaired hepatic function. However, complications, such as obstructive jaundice, rupture, intracystic haemorrhage and infection, can occur.^{1–3} In this report, we present a case of a patient with an infected hepatic cyst diagnosed by a change in CT findings and he was subsequently treated with percutaneous transhepatic drainage.

CASE PRESENTATION

An 82-year-old man developed anorexia, fever and fatigue 3 days after undergoing a routine gastrointestinal endoscopy in which no abnormality had been found. He gave no history of diarrhoea, cough or sputum. Evaluation at an emergency department revealed temperature 38.1°C. Routine laboratory data showed C-reactive protein (CRP) 9.6 mg/dl with no other remarkable findings. The fever did not resolve even after taking levofloxacin 500 mg OD for 2 days and subsequently, he was admitted to our hospital.

His history was remarkable for hypertension (managed on amlodipine besilate, olmesartan medoxomil, doxazosin mesilate, torasemide), dyslipidemia (managed on bezafibrate), stage II prostatic carcinoma (treated with endocrine therapy for >5 years) and chronic kidney disease (creatinine 1.51 mg/dl). Importantly, he also volunteered a history of fever and jaundice requiring hospitalisation 6 years ago when an abdominal CT scan had revealed multiple hepatic cysts with no relationship with the bile ducts and no gallstones. For 6 years he did not exhibit any abdominal symptoms. He had no exposure to dogs, foxes or other unusual creatures and had not travelled abroad.

On admission, his body temperature was 38.4°C, the pulse rate 78 per min, respiratory rate 20 per min and

blood pressure was 142/68 mm Hg. There was pallor but no icterus, rash or lymphadenopathy. Cardiovascular, respiratory and neurological examinations were

Table 1 Laboratory data on admission.

	Value	Reference range
White-cell count (10 ⁹ /l)	8.8	3.9–9.8
Neutrophil (10 ⁹ /l)	7.8	
Haemoglobin (g/dl)	10.3	13.5–17.6
Hematocrit (%)	29.7	39.8–51.8
Platelet count (10 ⁹ /l)	159	131–362
C-reactive protein (mg/dl)	28.9	<0.2
Total protein (g/dl)	6.2	6.4–8.1
Albumin (g/dl)	3.7	4.0–5.1
Urea nitrogen (mg/dl)	20	8–20
Creatinine (mg/dl)	1.51	0.53–1.01
Creatine kinase (IU/l)	81	22–160
Lactate dehydrogenase (IU/l)	226	116–230
Aspartate amino transferase (IU/l)	47	12–32
Alanine amino transferase (IU/l)	33	5–36
Alkaline phosphatase	122	120–350
-Glutamyltransferase (IU/l)	52	11–69
Choline esterase (IU/l)	160	192–446
Total-bilirubin (mg/dl)	1.2	0.3–1.1
Amylase (IU/l)	22	40–120
Glucose (mg/dl)	133	60–100
Sodium (mEq/l)	139	137–146
Potassium (mEq/l)	3.5	3.6–4.8
Chloride (mEq/l)	104	98–107
Ionised calcium (mEq/l)	9.2	8.7–10.3
Fibrinogen (mg/dl)	747	200–400
FDP (μg/ml)	7.7	<5.0
D-dimer (μg/ml)	2.3	0.0–1.0
Activated partial thromboplastin time (s)	34.0	25.0–50.0
Prothrombin time (s)	15.1	10.0–15.0
International normalised ratio	1.27	

FDP, fluorodeoxyglucose

Figure 1 CT scan images on admission. Contrast-enhanced abdominal CT scans showed a low density lesion in the left lateral segment of liver. Scale bar: 5 cm.

unremarkable. The abdomen was soft with normal bowel sounds. No tenderness or hepatosplenomegaly was palpable. No costovertebral tenderness or pedal oedema was found.

INVESTIGATIONS

Flu antigen type A and B were negative. The white-cell count was 8,800/ μ l with a left shift and the serum CRP was elevated to 28.9 mg/dl. Serum creatinine was the same as the patient's previous data. The results of other laboratory tests are shown in table 1.

No organism was detected in the blood and sputum cultures (aerobic and anaerobic) on admission and during hospitalisation. Antibodies against hepatitis C virus, hepatitis B surface antigen, antibody against human immunodeficiency virus type 1 and 2 were all negative. Bone marrow aspiration showed inflammation (toxic granules), and no abnormal blood cells were indicated. Mycobacterium culture from a bone marrow sample and a QuantiFERON®TB-2G test (Cellestis International Pty Ltd., Australia) were negative.

Thoracic and abdominal radiography on admission indicated no remarkable findings. An ultrasonographic (US) screening test of the abdomen showed multiple hepatic cysts, but no abnormal findings were indicated in kidneys, pancreas, bladder, or other areas of the abdomen. Chest and abdominal CT studies showed infiltration of the lower lobe of the right lung and several low density lesions (six cysts) in the liver (figure 1). Pulmonary infiltrate was considered to be the focus of fever.

Initially, probable aspiration pneumonia was treated with ampicillin/sulbactam and clindamycin, but the fever did not resolve. Therefore, on the 4th day of admission, the antibiotics were switched to meropenem. On the 10th day, body temperature was still above 37.5°C and CRP was above 15 mg/dl. A ^{67}Ga scan, which was performed on the 9th day of admission, revealed Ga intake at the anterior wall of the cyst in the left lobe of the liver (figure 2). To distinguish the main cyst of inflammation from multiple hepatic cysts, a contrast-enhanced abdominal CT scan was conducted, and this revealed a low density lesion in the left

Figure 2 A ^{67}Ga scintigraphic study of the entire body. An axial image of the abdomen. Intake of Ga was found in the left lobe of the liver and the anterior wall of the hepatic cyst.

lateral segment of the liver with a faint peripheral enhancement (figure 3) and cyst enlargement (from 67 × 79 mm to 82 × 85 mm). Moreover, the density of the cyst was increased compared to the density observed on admission (from 6.5 to 16.7 HU).

A diagnosis of an infected hepatic cyst was made, and percutaneous transhepatic drainage of the cyst was performed on the 13th day of admission. A milky yellow fluid was obtained, and the patient's fever resolved soon after drainage. The total volume of the drained fluid from the cyst was about 600 ml. No bacteria were detected in the gram staining of the fluid obtained from the cyst. A typical image of the staining showed debris from the neutrophils and the monocytes. No organism was cultured from the fluid of the cyst (aerobic and anaerobic). The serum CRP concentration decreased after drainage (figure 4). The elevation in aspartate amino transferase/alanine amino transferase after drainage might be due to traumatic damages by percutaneous transhepatic approach.

DIFFERENTIAL DIAGNOSIS

Based on the images obtained from US and CT scans of the hepatic cysts in this case, it was concluded that metastatic tumour, primary hepatoma and amoebic liver abscess were all unlikely. In addition, these images were also not typical for pyogenic liver abscess. Radiographically, hepatic cysts are usually simple, although internal complexities may develop if they are secondarily infected or filled with blood. The US image on admission showed normal hepatic cysts without the typical appearance of abscesses. Contrast-enhanced CT scans of infected hepatic cysts typically show peripheral enhancement and pericystic oedema.⁴ The atypical US and CT images of this patient made the diagnosis difficult.

We performed a ^{67}Ga scintigraphic study to search for the focus of the infection. Recently 18-F-fluorodeoxyglucose (FDG) has shown promise as an agent for detection of cyst infections using positron emission tomography (PET). The use of FDG-PET has been proven to enhance the process

of identification of renal and/or hepatic cyst infection.⁵ Unfortunately, FDG-PET was not available during this case. Diagnosis of infected cysts might be easier with Ga-scintigraphy and, even better, with FDG-PET, when no typical CT or ultrasound signs of infection were noted at first.

In this case, renal cysts were not visible on the CT scan, and no familial history of liver diseases was found, which denies the diagnosis of polycystic liver disease (PLD). Infection of the simple hepatic cyst is rarer than that of PLD¹, although common mechanism is supposed for infection of both types of liver cysts.

Figure 3 Contrast-enhanced abdominal CT scan images on the 12th day of admission. Cyst enlargement and faint peripheral enhancement were indicated. Scale bar: 5 cm.

TREATMENT

On the 13th day of admission, subsequent to the drainage procedure, the antibiotics were switched to ampicillin/sulbactam. As CRP decreased, the antibiotics were switched to amoxicillin on the 35th day of admission and continued for about 6 months. He left the hospital 50th day of admission.

OUTCOME AND FOLLOW-UP

He has been off antibiotics for over 12 months and is doing well.

DISCUSSION

There are gut manipulations during abdominal operations, chronic haemodialysis, diabetes mellitus and in immuno-suppressive states.^{3 6} All of these were neglected in this case. Infections of simple hepatic cysts with *Klebsiella pneumoniae*³ and *Escherichia coli*,⁷ presenting with acute onset of right upper quadrant abdominal pain, diarrhoea, and fever have been reported. In this case, no microorganisms were detected from cyst of the hepatic cyst. This might be due to pretreatment of antibiotics. Infection of microorganisms to hepatic cyst could occur through common bile duct or blood stream. Suspected microorganisms except for *E.coli*, *Klebsiella* are *Proteus*, *Bacteroides*, *Clostridium*, etc.^{3 6 7} In this case, *E. coli* could be expected because of his anatomical abnormalities: multiple hepatic cysts. The most likely source of infection for simple liver cysts was the gastrointestinal tract. In two cases reported by Yoshida *et al*,^{3 7} diverticulitis of the sigmoid colon was supposed. Primary cystic disease of the liver and biloma is usually asymptomatic unless complications from mechanical compression occur. CT studies of the abdomen 6 years before admission indicated multiple hepatic cysts, and no relationship was found between these cysts and bile ducts, and no gallstones were found. However, if the pressure of intrahepatic bile duct increases by any reasons, communication between these cysts and bile ducts might occur.

Figure 4 Clinical course of CRP (▲), AST (aspartate amino transferase: ○), and ALT (alanine amino transferase: □). The arrow represents the day of drainage of the infected liver cyst.

Epinephrine injection for active duodenal ulcer during gastrointestinal endoscopy was reported to cause infected liver cyst.⁸ In our case, a gastrointestinal endoscopic examination was performed 5 days before admission. Thus, this endoscopic procedure, including air infusion, could be a possible cause of the hepatic cyst infection.

Even if patients have clinical symptoms that indicate hepatic cyst infection, diagnosis of an infected cyst by abdominal US, CT with contrast medium, and/or MRI can sometimes be complicated. We experienced an unusual case that had non-specific clinical symptoms, and no typical imaging findings from US and CT on admission. When a patient has liver cysts, fever and abdominal pain, liver cysts should be considered as a focus of infection. Repetition of US and/or CT should be considered, even if no typical findings are obtained initially. It is of note that conventional Ga-scintigraphy may be useful for the detection of infected site.

Learning points

- ▶ Hepatic cysts are usually asymptomatic and are not associated with impaired hepatic function. However, complications, such as obstructive jaundice, rupture, intracystic haemorrhage and infection, can occur.
- ▶ When a patient has liver cysts and high-grade fever, liver cysts should be considered as a focus of infection.
- ▶ Repetition of ultrasonography and/or CT studies should be considered, even if no typical findings are obtained initially.
- ▶ It is of note that conventional Ga-scintigraphy may be useful for the detection of infected site.

Acknowledgements The authors would like to thank Naoko Yamaguchi, Chizuko Kuramoto and Reiko Sano (Central Clinical Laboratory) for providing their technical support and assisting data analysis; Akimasa Uehara, Yukinari Yamaguchi, Yukihiko Hashimoto (First Department of Internal Medicine), Soichiro Saikawa, Norihisa Nishimura (Third Department of Internal Medicine), and Satoshi Kutsuna (Center for Infectious Diseases) for their clinical advices; and Yasunori Enomoto and Takahiko Kasai (Department of Diagnostic Pathology) for critically reviewing the manuscript.

Competing interests None.

Patient consent Obtained.

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Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Mori E, Akai Y, Matsumoto T, Kawaratani H, Horii M, Iwano M, Uemura S, Nonomura A, Fukui H, Saito Y. Hepatic cyst infection in a healthy older male. *BMJ Case Reports* 2012;10.1136/bcr.04.2011.4136, Published XXX

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