

A *Klebsiella pneumoniae* liver abscess presenting with myasthenia and tea-colored urine

A case report and review of 77 cases of bacterial rhabdomyolysis

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Abstract

Rationale: Rhabdomyolysis is a well-known syndrome in clinical practice, although rhabdomyolysis caused by a liver abscess is rarely reported and the patient may lack symptoms that are associated with a primary site of infection. Early recognition of this possibility is needed to avoid diagnostic delay and facilitate treatment. We report the case of a 71-year-old woman with a *Klebsiella pneumoniae* (KP) pyogenic liver abscess who presented with myasthenia and tea-colored urine and also review the 77 reported cases of bacterial rhabdomyolysis.

Patient concerns: The patient was 71 years old and presenting with a 7-day history of myasthenia and a 3-day history of tea-colored urine, but without fever or abdominal pain.

Diagnoses: Laboratory testing in our case revealed rhabdomyolysis, and blood culture revealed KP. Abdominal ultrasonography revealed a hypoechoic enclosed mass, and computed tomography (CT) revealed an enclosed low-density mass (8.3 × 6.6 × 6.1 cm). The main diagnoses were a pyogenic liver abscess with rhabdomyolysis.

Interventions: Empirically intravenous piperacillin-sulbactam and intravenous potassium treatment, as well as fluid infusions and other supportive treatments were provided after admission. After the diagnosis was confirmed and susceptibility test results were available, we adjusted the antibiotics to cefoperazone and sulbactam, which were maintained for 6 weeks.

Outcomes: The patient's symptoms relieved and the abnormal laboratory parameters corrected. Follow-up abdominal ultrasonography at 24 months after her discharge revealed that the abscess had disappeared.

Lessons: Early recognition and careful consideration of the underlying cause of rhabdomyolysis are critical to improving the patient's prognosis. Thus, physicians should carefully consider the underlying cause in elderly patients who present with rhabdomyolysis, as they may lack symptoms of a primary infection.

Abbreviations: ARF = acute renal failure, CK = creatine kinase, CNS = central nervous system, CT = computed tomography, KP = *Klebsiella pneumoniae*, PLT = platelet, WBC = white blood cell.

Keywords: elderly, *Klebsiella pneumoniae*, liver abscess, rhabdomyolysis

1. Case report

The patient approved the publication of this report. A 71-year-old woman with a 7-day history of myasthenia and a 3-day history of tea-colored urine, but without fever or abdominal pain, was admitted to our ward on December 1, 2014. She had hypertension, diabetes mellitus, and hyperlipidemia, which had been treated using nifedipine, repaglinide, metformin, and

atorvastatin. No herbal supplements or herbal teas were used. The patient did not have a history of strenuous exercise. A physical examination at the admission revealed a temperature of 38.2°C, which increased to 39.5°C during the same day, as well as percussion-related pain in the hepatic region and muscle weakness in both legs.

Laboratory testing revealed leukocytosis (white blood cell (WBC) was $12.97 \times 10^9/L$, 94.33% neutrophils), newly emerged severe thrombocytopenia (platelet (PLT) of $27.2 \times 10^9/L$), and the urine blood test (dry-chemistry method) was strongly positive without complete red blood cells or WBCs. The serum potassium level was 3.12 mmol/L, the serum creatine kinase (CK) level was significantly elevated (6020 IU/L), and the blood and urine were positive for myohemoglobin (2396.3 and 275.4 ng/mL, respectively). Her C-reactive protein level was 195 mg/L, her procalcitonin level was 3.34 ng/mL, and her glycosylated hemoglobin level was 7.1%. A blood culture from the admission revealed KP. Her serum creatinine level was normal and no findings were observed during screening for cerebrovascular disease, autoimmune disease, hemolytic disease, or altered thyroid function. Negative results were observed from testing for influenza A and B viruses, as well as for antibodies to *Mycoplasma* and *Chlamydia*.

Abdominal ultrasonography revealed a hypoechoic mass in the S6 segment of the liver, and abdominal CT (Fig. 1A and B) revealed an enclosed low-density mass in the liver (8.3 cm × 6.6 cm × 6.1 cm), which suggested a liver abscess. Based on these findings, the

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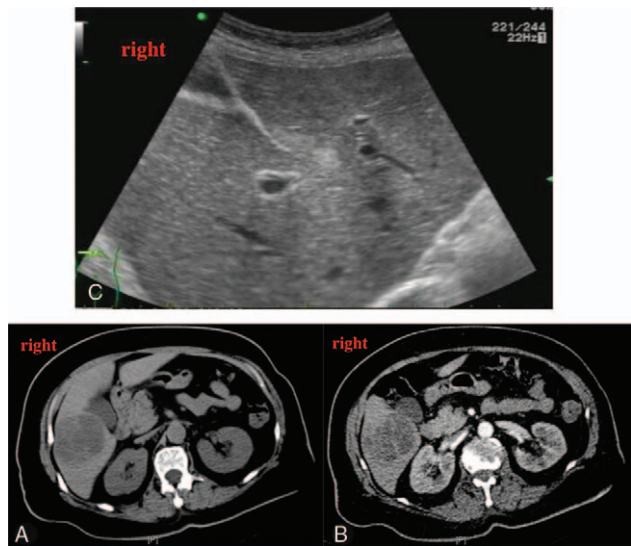


Figure 1. Plain (A) and enhanced (B) abdominal computed tomography revealed an enclosed plurilocular mass. The walls and compartment of the mass exhibited enhancement, although the contents did not. Follow-up ultrasonography at 24 months revealed that the abscess had disappeared (C).

diagnoses were a pyogenic liver abscess with hypokalemia and rhabdomyolysis. After admission, we empirically provided intravenous piperacillin–sulbactam (2.5 g every 8 hours) for 6 days before the blood culture results were available. Intravenous potassium treatment (9 g/day) was also administered for 4 days before the serum potassium level returned to normal, as well as fluid infusions (2.5–3 L/day) and other supportive treatments. After the diagnosis was confirmed and susceptibility test results were available, we adjusted the antibiotics to cefoperazone and sulbactam (3 g twice per day), which were maintained for 6 weeks. This was because the abscess was large and the patient and her family refused puncture and placement of a drainage tube. The patient’s body temperature, CK level, and myohemoglobin levels in the urine and blood subsequently returned to normal (Supplementary Fig. 1, <http://links.lww.com/MD/C40>). Abdominal ultrasonography at 24 months after discharge revealed that the abscess had disappeared (Fig. 1C).

2. Discussion

Liver abscess is a common type of visceral abscess that is caused by a bacterium, fungus, or amoeba. The estimated annual incidence of pyogenic liver abscess is approximately 2.3 cases per 100,000 population, and the incidence is higher among male patients.^[1] In China, pyogenic liver abscesses are predominantly caused by KP (77.1% of all cases),^[2] although liver abscesses presenting with myasthenia and tea-colored urine (indicative of rhabdomyolysis) are rare. To the best of our knowledge, there is only one English report describing a case of liver abscess-induced rhabdomyolysis.

Rhabdomyolysis is a syndrome that results from separation of striated muscle fibers, which allows muscle enzymes, myoglobin, potassium, calcium, and other molecules to enter the circulation. Two previous studies have indicated that infectious rhabdomyolysis accounts for 5% to 31% of all cases.^[3,4] Our review of the 77 reported cases of bacterial rhabdomyolysis indicate that the most common organisms are *Legionella* spp., *Streptococcus* spp., and *Salmonella* spp. (Table 1),^[5–32] and that cases most frequently involve patients who are 40 to 50 years old (Fig. 2). The most common site of primary infection leading to

Table 1
The 77 reported cases of bacterial rhabdomyolysis.

Organisms	Cases, n	Ages, y	Male/total patients, n (%)	Fever/total patients, n (%)	Myalgia/total patients, n (%)	Myoglobinuria/total patients, n (%)	CK range, U/L	ARF/total patients, n (%)	Deaths/total patients, n (%)
<i>Legionella</i> spp.	19	26–67	17/19 (89.47)	17/19 (89.47)	8/13 (61.54)	6 × NA	1089.21 to >600,000	16/19 (84.21)	4/19 (21.05)
<i>Streptococcus</i> spp.	17	27–81	13/17 (76.47)	13/15 (86.67)	10/12 (83.33)	5 × NA	242 to 151,000	11/15 (73.33)	5/16 (31.25)
<i>Salmonella</i> spp.	13	21–68	11/13 (84.62)	9/10 (90)	5/7 (71.43)	6 × NA	1870 to 102,500	13/13 (100)	1/13 (7.69)
<i>Staphylococcus</i> spp.	6	18–70	6/6 (100)	4/4 (100)	3/5 (60)	1 × NA	1440 to 83,000	5/6 (83.33)	2/5 (40)
<i>Francisella tularensis</i>	4	31–63	3/4 (75)	4/4 (100)	2/2 (100)	2 × NA	1049 to 474,000	4/4 (100)	1/4 (25)
<i>Listeria monocytogenes</i>	3	57–69	2/3 (66.67)	3/3 (100)	0/3 (0)	1 × NA	5000 to 149,500	2/3 (66.7)	0/3 (0)
<i>Vibrio vulnificus</i>	2	38–51	1/2 (50)	2/2 (100)	2/2 (100)	2 × NA	9260.1 × NA	2/2 (100)	2/2 (100)
<i>Aeromonas</i> spp.	2	43–47	1/2 (50)	2/2 (100)	2/2 (100)	NA	5570 to 13,317	2/2 (100)	1/2 (50)
<i>Pseudomonas</i> spp.	1	74	1/1 (100)	1/1 (100)	1/1 (100)	NA	3324	1/1 (100)	1/1 (100)
Polymicrobes: (<i>Klebsiella pneumoniae</i> , <i>Escherichia coli</i> , <i>Clostridium perfringens</i>)	1	80	1/1 (100)	1/1 (100)	0/1 (0)	1/1 (100)	754	1/1 (100)	0/1 (0)
<i>Plasmodium falciparum</i>	1	32	1/1 (100)	1/1 (100)	1/1 (100)	1/1 (100)	32,000	0/1 (0)	0/1 (0)
<i>Mycoplasma pneumoniae</i>	1	47	1/1 (100)	1/1 (100)	0/1 (0)	1/1 (100)	25,422	1/1 (100)	0/1 (0)
<i>Leptospira australis</i>	1	61	0/1 (0)	1/1 (100)	1/1 (100)	NA	7120	1/1 (100)	1/1 (100)
<i>Herbicola lathyr</i>	1	42	1/1 (100)	1/1 (100)	1/1 (100)	1/1 (100)	21,980	1/1 (100)	1/1 (100)
<i>Escherichia coli</i>	1	86	1/1 (100)	0/1 (0)	0/1 (0)	1/1 (100)	11,440	1/1 (100)	0/1 (0)
<i>Brucella melitensis</i>	1	25	1/1 (100)	1/1 (100)	1/1 (100)	1/1 (100)	337,000	1/1 (100)	0/1 (0)
<i>Borrelia burgdorferi</i>	1	81	1/1 (100)	1/1 (100)	1/1 (100)	1/1 (100)	29,988	1/1 (100)	1/1 (100)
<i>Paitea agglomerans</i> ^[4] (<i>Enterobacter</i> spp.)	1	70	1/1 (100)	1/1 (100)	1/1 (100)	1/1 (100)	37,636	1/1 (100)	0/1 (0)
<i>Klebsiella pneumoniae</i> (the present case)	1	71	0/1 (0)	1/1 (100)	0/1 (0)	1/1 (100)	6020	0/1 (0)	0/1 (0)
Total	77	18–86	63/77 (81.82)	64/69 (92.8)	39/57 (68.4)	43/53 (81.1)		65/75 (86.7)	20/75 (26.7)

ARF = acute renal failure, CK = creatine kinase, NA = not available.

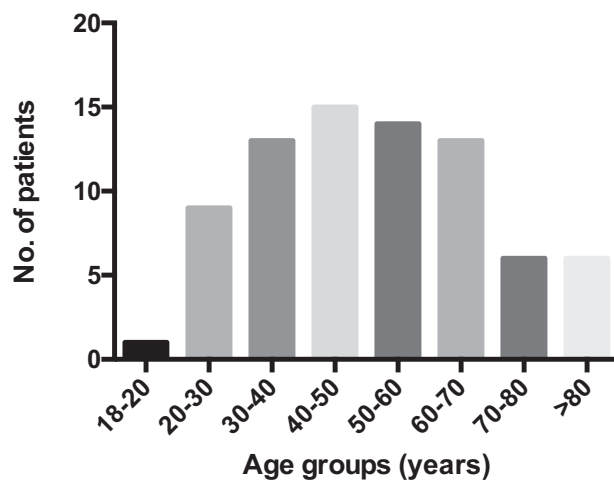


Figure 2. Age distribution for the 77 patients with bacterial rhabdomyolysis.

rhabdomyolysis is the respiratory system (38–46.1% of all analyzed cases, Fig. 3),^[3,5–32] and the liver is rarely involved, with only one case of rhabdomyolysis caused by a liver abscess described in the English literature. That case involved *Pantoea agglomerans* (bolded in Table 1).^[14] Compared to noninfectious rhabdomyolysis, cases of infectious rhabdomyolysis tend to involve older patients (70.81 years old vs 55.31 years old) and more female patients (31.3% vs 9.3%), as well as significantly lower CK levels (3710.1 IU/L vs 19785.4 IU/L).^[3]

Although complete CK data were not available for all reported cases, the CK level in the present case was relatively low (as a product of the rhabdomyolysis), which agrees with the previously reported data. In addition, our patient exhibited concurrent hypokalemia, which likely reflects an even lower serum potassium level before the rhabdomyolysis occurred. Serious hypokalemia can also cause rhabdomyolysis, although the patient did not have any related medical condition and responded well to potassium supplementation after the infection was controlled. Furthermore, studies have revealed a hypokalemia prevalence of 23% among hospitalized patients with infectious disease.^[33] Thus, we speculate that the hypokalemia might have been caused by infection and associated multiple organ dysfunction, which can be inferred from the Sequential Organ Failure Assessment score of 6 points at the admission. Moreover, her serum potassium levels normalized after treatment, and the hypokalemia might have contributed to the rhabdomyolysis.

As medications are common causes of rhabdomyolysis, we investigated the patient's medications and observed that she had received nifedipine, repaglinide, metformin, and atorvastatin. A search of the literature ("nifedipine, rhabdomyolysis" and "repaglinide, rhabdomyolysis") revealed no related cases or data. Although there are cases of metformin-induced rhabdomyolysis, they are typically associated with overdose.^[34,35] Interestingly, atorvastatin is the second most prescribed statin (24.4–36%),^[36,37] and the incidence of atorvastatin-induced myopathy is approximately 14.9%.^[38] However, the patient had discontinued atorvastatin for 1 month before the onset of rhabdomyolysis, and we are not aware of any delayed cases of atorvastatin-induced rhabdomyolysis. Thus, there is no evidence to indicate that our patient had drug-induced rhabdomyolysis.

This case was diagnosed during the influenza season, and influenza can also present with myasthenia and fever, as well as

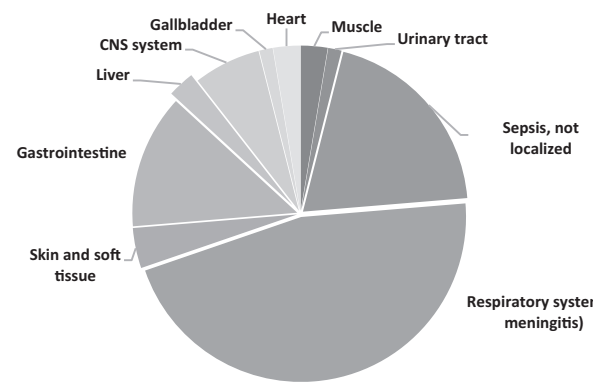


Figure 3. Distribution of the primary site of infection among 76 patients with bacterial rhabdomyolysis. Information regarding the primary site of infection was not available for 1 patient.

be complicated by myositis or rhabdomyolysis.^[39] Thus, this possibility should be considered in similar cases. However, the patient denied being exposed to individuals with a fever, and no influenza A or B viruses were detected after her admission. Therefore, there is no evidence to indicate that influenza virus infection was involved in this case.

In conclusion, elderly patients with a liver abscess may lack symptoms that are associated with a primary site, which can make it difficult to diagnose. However, this condition can cause serious complications, such as rhabdomyolysis. Thus, it is important to investigate the underlying cause in elderly patients with rhabdomyolysis, and to consider the possibility of a liver abscess.

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