First Report of Liver Abscess Caused by *Salmonella enterica* Serovar Dublin

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This is the first reported case of liver abscess attributable to *Salmonella* serovar Dublin infection and also the fourth case of *Salmonella* liver abscess complicated with hepatocellular carcinoma reported since 1990. Drainage combined with intravenous antibiotics resulted in improvement, but recovery regressed again. Subsequent hepatic left lobectomy led to full recovery.

**CASE REPORT**

A 58-year-old man presented with chills and high fever (temperature, 40°C; blood pressure, 86/52 mm Hg) after interventional therapy (transarterial embolization) of hepatocellular carcinoma operated on 15 February 2012 in our hospital. This patient was diagnosed with chronic hepatitis B 12 years ago, liver cirrhosis 6 years ago, and hepatocellular carcinoma 2 years ago. During the last 2 years, he received interventional therapy for hepatocellular carcinoma five times. He never took immunosuppressive drugs. On 15 February, he was diagnosed as having septic shock and abdominal pain. Cultures of the abscess indicated a large abscess in the left hepatic lobe. He showed no significant improvement. He was admitted to our hospital on 28 March. A magnetic resonance imaging (MRI) scan performed in blood cultures, and then an antimicrobial susceptibility test, as determined with the automated bacterial identification and antibiotic susceptibility testing system Vitek 2 (bioMérieux, France), showed that this strain was susceptible to ampicillin, piperacillin, ceftriaxone, cefotaxime, cefepime, ceftazidime, imipenem, meropenem, amikacin, cefmetazole, cefoperazone-sulbactam, ticarcillin-clavulanate, levofloxacin, and sulfamethoxazole. The symptoms improved rapidly with antimicrobial treatment, and the next four blood cultures gave negative results. The patient recovered, and he was discharged on 3 March with antimicrobial administration discontinued.

The patient presented with fever (temperature, 39°C) again as well as epigastric pain but no chill after catching a cold on mid-March. He visited the local hospital on 18 March and received intravenous administration of imipenem–cilastatin for 8 days, but he showed no significant improvement. He was admitted to our hospital on 28 March. A magnetic resonance imaging (MRI) scan of the abdomen indicated a large abscess in the left hepatic lobe (Fig. 1). The patient then received intravenous administration of teicoplanin–cefoperazone–sulbactam for 10 days, but no significant improvement was observed. Repeated blood cultures gave negative results. On 20 April, computed tomography (CT)-guided percutaneous needle aspiration of the abscess was performed and about 20 ml of purulent fluid was obtained. The next day, pure growth of *S. enterica* Dublin was observed in puncture fluid cultures. This strain had an antimicrobial susceptibility profile identical to that of the isolate obtained on 15 February. From 21 to 27 April, intravenous antimicrobial treatment was given with meropenem–cefoperazone–sulbactam, and two additional drainings of the abscess through 3-day intermittent CT-guided percutaneous needle aspiration were performed, but no puncture liquid could be obtained. The patient’s temperature returned to normal on 25 April but increased to 39.3°C 2 days later. The patient received a hepatic left lobectomy on 28 April, and after that, his temperature returned to normal gradually and general conditions recovered gradually.

The two bacterial isolates were identified as *Salmonella* with the Vitek 2 system and then were serotyped to be serovar Dublin (O9, O12, H1, and H17) by the slide agglutination method with *Salmonella* hyperimmune antiserum (Statens Serum Institut, Copenhagen, Denmark). The almost complete 16S rRNA gene was amplified by PCR with the universal eubacterial primers 27F (AGAGTTTGATCCTGGCTCAG; *Escherichia coli* ribosomal DNA base pair positions 8 to 27) and 1492r (TACGCTTGTACGACTT; positions 1492 to 1507) (1). The sequenced DNA fragments showed 100% identity to those of type strain CT_02021853 of *S. enterica* Dublin.

Salmonellosis, an infection with *Salmonella* bacteria, is still a major public health problem. There are more than 2,500 serovars of *Salmonella*, and most of the human–pathogenic *Salmonella* serovars (e.g., Typhi, Paratyphi A, Enteritisid, Infantis, and Dublin) belong to *S. enterica* subsp. *enterica*. *S. enterica* Typhi and occasionally Paratyphi A are the causative agents of typhoid fever, a serious, often fatal, disease very common in developing countries (2). Diseases caused by nontyphoidal *Salmonella* varied from mild self-limited gastroenteritis to severe, invasive infections, such as bacteremia, osteomyelitis, and meningitis (2). This report describes what we believe to be the first case of liver abscess attributable to *S. enterica* Dublin infection.

Pyogenic liver abscess is most frequently caused by *Klebsiella pneumoniae* and *Escherichia coli*, followed by *Pseudomonas*, *Staphylococcus*, *Streptococcus*, *Enterococcus*, and *Enterobacter* (3, 4). Cases of liver abscess due to *Salmonella* organisms are rare. To-
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FIG 1 MRI scan image. A nearly elliptic abscess lesion (4.2 by 7.4 cm in size) was observed in the left hepatic lobe, suggesting a liver abscess.

together with the current case, there have been 23 cases of Salmonella liver abscesses published in the literature in English deposited in the PubMed database since 1990 (5–23). At least four Salmonella serovars—Typhi, Paratyphi, Enteritidis, and Infantis—have been identified as the causative agents of liver abscesses. This report is the first presentation of a case of liver abscess due to a Salmonella serovar Dublin infection. In addition, this is the fourth reported case of Salmonella liver abscess occurring within a primary hepatocellular carcinoma since 1990 (9, 15, 21). Although it is extremely rare, Salmonella liver abscess is reported herein as an unusual complication of hepatocellular carcinoma.

S. enterica Dublin can be frequently found in animals, especially in cattle, and is a known veterinary pathogen (24). Human infection with S. enterica Dublin is an unusual occurrence, although reports of isolates from humans have increased over the past 3 decades (25–27). The S. enterica Dublin strain isolated in this case report was sensitive to all of the antibiotics tested, but intravenous antibiotics alone were ineffective in treating the infection. It was thought that the wall of the abscess was thick, and thus it would be difficult for the antibiotic molecules to diffuse into the infection sites. The therapeutic strategy was then shifted to drainage followed by intravenous antibiotics, which had been previously recommended to treat a large (>3-cm) hepatic abscess (19), which led to rapid and significant improvement, although recovery regressed soon afterwards. This might be due to the presence of a primary hepatocellular carcinoma. Subsequent hepatic left lobectomy after consultation with surgical doctors led to the patient’s full recovery.

Conclusion. This report describes the first case of liver abscess due to a Salmonella serovar Dublin infection. This is the fourth reported case of Salmonella liver abscess as a complication of hepatocellular carcinoma since 1990. Drainage of the abscess followed by intravenous antibiotics resulted in rapid and significant improvement, but recovery regressed again. A subsequent hepatic left lobectomy led to full recovery.


