First report of liver abscess caused by *Salmonella enterica* serovar Dublin

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ABSTRACT

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

CASE REPORT

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, Enteritidis, Infantis, and Dublin) belong to *S. enterica* subspecies *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 (9). Diseases caused by nontyphoidal *Salmonella* varied from mild self-limited gastroenteritis to severe, invasive infections such as bacteremia, osteomyelitis, and meningitis (9). This report describes what we believe to be the first case of liver abscess attributable to *S. enterica* Dublin infection.

A 58 year-old man presented with chills and high fever (temperature: 40°C; blood pressure: 86/52 mmHg) after interventional therapy (transarterial embolization) of hepatocellular carcinoma operated in February 15, 2012 in our hospital. This patient was diagnosed as chronic hepatitis B twelve years ago, liver cirrhosis six years ago, and...
hepatocellular carcinoma two years ago. During the last two years, he received five times
of interventional therapy of hepatocellular carcinoma. He never took immunosuppressive
drugs. On February 15, he was diagnosed as septic shock and received intravenous
administration of cefoperazone/sulbactam immediately after taking blood for bacterial
cultures. The next day, pure growth of *S. enterica* Dublin was observed in blood cultures,
and then the 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 next four times of blood
culture gave negative results. He was recovered and discharged on March 3 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 March 18
and received intravenous administration of imipenem/cilastain for eight days, but he got no
significant improvement. He was admitted to our hospital on March 28. A magnetic
resonance imaging (MRI) scan of the abdomen indicated a large abscess in left hepatic
lobe (Figure 1). The patient then received intravenous administration of
teicoplanin/cefoperazone/sulbactam for ten days, but no significant improvement was
observed. Repeated blood cultures gave negative results. On April 20, 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 the isolate obtained on February 15. From April 21 to April 27, intravenous antimicrobial treatment was given with metronidazole/cefoperazone/sulbactam, and two addition times of drainage of the abscess through three-day intermittent CT-guided percutaneous needle aspiration were operated but no puncture liquid could be obtained. The temperature returned to normal on April 25 but increased to 39.3°C two days later. The patient received hepatic left lobectomy on April 28, and after then his temperatures returned to normal gradually and general conditions recovered gradually.

The two bacterial isolates were identified belonged to *Salmonella* with VITEK® 2, and then serotyped to be serovar Dublin (O9+, O12+, H1gp+) by the slide agglutination method with *Salmonella* hyperimmune aitsera (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 position 8 to 27) and 1492r (TACCTTGTTACGACTT; position 1492 to 1507) (10). The sequenced DNA fragments showed 100% identity with that of type strain CT_02021853 of *S. enterica* Dublin.

Pyogenic liver abscess is most frequently caused by *Klebsiella pneumonia* and *E. coli*, followed by *Pseudomonas, Staphylococcus, Streptococcus, Enterococcus*, and *Enterobacter* (1, 20). Cases of liver abscess due to *Salmonella* organisms are rare. Together with the current case, there are twenty-three cases of *Salmonella* liver abscesses published...
in English literatures deposited in PubMed database since 1990 (2-5, 7, 11-14, 16-18, 21-27). At least four *Salmonella* serovars Typhi, Paratyphi, Enteritidis, and Infantis have been identified as the causative agents of liver abscess. 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 (7, 17, 25). Although extremely rare, *Salmonella* liver abscess is reported herein as an unusual complication of hepatocellular carcinoma.

As a veterinary pathogen, *S. enterica* Dublin can be frequently found in animals especially including cattle and is a known veterinary pathogen (19). Human infection with *S. enterica* Dublin is an unusual occurrence, although reported human isolates have increased over the past three decades (6, 8, 15). The *S. enterica* Dublin strain isolated in this case report was sensitive to all the antibiotics tested, but intravenous antibiotics alone was ineffective in treating the infection. It was thought that the wall of the abscess was thick and thus antibiotics molecules would be difficult to diffuse into the infection sites. The therapeutic strategy was then shifted into drainage followed by intravenous antibiotics, which has been previously recommended to treat large (more than 3 cm) hepatic abscess (23), led to rapid and significant improvement but 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 fully recover.

**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 abscess followed by intravenous antibiotics resulted in rapid and significant improvement but recovery regressed again. Subsequent hepatic left lobectomy led to full recovery.

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References


Figure 1. MRI scan image. A nearly elliptic abscess lesion (4.2× 7.4 cm in size) was observed in the left hepatic lobe, suggesting a liver abscess.