INVASIVE SALMONELLOSIS PRESENTING AS A LUNG ABSCESS: A CASE REPORT

Munjit Na Songkhla and Methee Chayakulkeeree

Division of Infectious Diseases and Tropical Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Abstract. *Salmonella* spp are an uncommon cause of lung abscess. A 59 year old man presented to our hospital with a 1 month history of cough and low grade fever progressing to high grade fever for 1 week. He had a past medical history significant for diabetes mellitus type 2 and focal segmental glomerulosclerosis for which he was receiving prednisolone, initially at 60 mg daily tapering to 20 mg daily. On presentation he was febrile and had decreased breath sounds and dullness to percussion over the right lower lung field. A chest X-ray showed a cavitary lesion with an air-fluid level in the right lung. Computed tomography of the lung revealed 2 cavitary lesions in the right upper and lower lungs. Sputum culture revealed *Salmonella* spp group B. He was treated successfully with ceftriaxone intravenously for 1 month followed by oral cefdinir. A chest X-ray at 1 month showed significant improvement; he was treated conservatively without surgical drainage. *Salmonella* can cause lung abscesses, especially in the immune suppressed.

Keywords: *Salmonella* group B, extraintestinal salmonellosis, lung abscesses, focal segmental glomerulosclerosis, salmonellosis

INTRODUCTION

*Salmonella* is an enteric gram-negative bacillus that normally causes invasive disease in immunocompromized patients with a defect in cell-mediated immunity and rarely causes pulmonary infections (Crump *et al*, 2015). *Salmonella* infection in patients with a normal immune status usually manifests as enteric fever or typhoid fever (Pegues and Miller, 2015). Non-

Correspondence: Dr Methee Chayakulkeeree, Division of Infectious Diseases and Tropical Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, 2 Wanglang Road, Bangkok Noi, Bangkok 10700, Thailand.
Tel: +66 (0) 2419 9462; Fax: +66 (0) 2419 7783
E-mail: methee.cha@mahidol.ac.th

Typhoid salmonellosis usually presents with self-remitting acute gastroenteritis in immunocompetent individuals (Ispahani and Slack, 2000). Immunocompromized adults may present with primary bacteremia without gastrointestinal symptoms, suggesting the infection arises from bacterial reactivation to a dormant site, such as the reticuloendothelial system, rather than secondary to a gastrointestinal infection (Pegues and Miller, 2015). A lung abscess is localized necrosis of lung tissue caused by a microbial infection, usually as a complication of aspiration pneumonia (Walters *et al*, 2011). Another possible route of *Salmonella* infection is hematogenous spread and should be suspected in cases with multiple abscesses in the lungs (Yazbeck *et al*, 2014). Common causative
pathogens of lung abscesses include mixed anaerobic bacteria, which colonize oral cavities and aerobes, such as *Staphylococcus aureus* (Yazbeck *et al.*, 2014). We report here a rare case of multiple lung abscesses caused by *Salmonella* group B, which resolved with antibiotic therapy only without surgical intervention.

**CASE REPORT**

A 59-year-old Thai male presented to Siriraj Hospital, Bangkok, Thailand with fever and cough for 1 month. Initially, he had low-graded fever and non-productive cough. He denied chest pain or weight loss. He initially did not seek medical treatment.

One week prior to presentation, his symptoms worsened. He developed productive cough with yellowish phlegm and inspiratory pain in right side of his chest. His fever worsened and he took paracetamol orally but the symptoms persisted. He went to a private clinic and was diagnosed with having a respiratory tract infection. He was prescribed with 1 dose of intramuscular medication and then 5 days of oral medication. There were no medical records from the clinic and the patient could not remember the names of the medication. His symptoms improved slightly with that medicine.

Three days prior to presentation, he developed high-grade fever and shortness of breath. His symptoms worsened daily until he was admitted to our hospital.

The patient had a history of focal segmental glomerulosclerosis (FSGS) diagnosed 6 years previously. His FSGS presented as bilateral leg edema and he underwent a kidney biopsy. He was treated with prednisolone, tacrolimus and cyclophosphamide. Two years prior to the presentation at our hospital he had remission of the FSGS and discontinued his medication. However, 6 months prior to presentation to our hospital he again developed bilateral leg edema again and was diagnosed with a relapse of his FSGS. He was again treated with prednisolone, initially at 60 mg daily tapering to 20 mg daily and was also given furosemide. He also given trimethoprim-sulfamethoxazole for pneumocystis pneumonia prophylaxis. He also had a history of diabetes mellitus type 2 which was poorly controlled despite taking medications regularly, probably due to corticosteroid use for his FSGS. He also had a history of essential hypertension which was well controlled. His medications of admission to our hospital were: prednisolone 15 mg/day, trimethoprim-sulfamethoxazole (80/400) 1 tab daily, glipizide 10 mg/day, vidalgliptin 50 mg/day, manidipine 10 mg/day and vitamin D2 20,000 iu/week.

He had worked as a farmer for 40 years in Nakhon Pathom Province, Thailand where he owned a swine farm. He had a 20 pack-year smoking history and drank alcohol occasionally until he stopped 20 years previously. He denied any intravenous drug use. He denied any herbal or over-the-counter drug use. He reported no family history of chronic lung disease or malignancies. He denied contact with active tuberculosis patients.

Physical examination revealed a temperature of 36.9°C, a pulse rate of 110/min, a blood pressure of 130/90 mmHg, a respiratory rate 24/min and an oxygen saturation of 98% on room air. Oral examination showed no oral thrush or oral hairy leukoplakia. He did not have any skin rashes. Chest examination revealed a mid-line trachea, normal chest expansion and dullness to percussion in the right lower lung. On lung auscultation there were decreased breath sounds and decreased
Fig 1–Chest X-ray posterior-anterior (PA) upright view showing a thick walled cavity with an air-fluid level in the right lung with blunting of the right costophrenic angle.

vocal resonance over the right lower lung area. He had no lymphadenopathy or hepatosplenomegaly. The neurological examination was unremarkable.

On laboratory testing he had a hemoglobin of 10.4 g/dl, a white blood cell count of 16,270/mm³ and a platelet count of 234,000/mm³. His creatinine level was 1.04 mg/dl, his aspartate aminotransferase (AST) level was 16 U/l, his alanine aminotransferase (ALT) level was 52 U/l, his albumin level was 2.5 g/dl and his globulin level was 5.6 g/dl. A human immunodeficiency virus (HIV) antibody assay was negative. His hepatitis B surface antigen and anti-hepatitis C virus antibody were negative.

An upright chest radiograph (Fig 1) showed a 2.2 x 2.3 cm thick-walled cavity with an air-fluid level and a blunt costophrenic angle in the right lung. A computed tomography (CT) scan (Fig 2) showed two cavitory lesions, one in the anterior segment of the right upper lobe of the lungs and in the anterior basal segment of the right lower lobe of the lungs which showed an air-fluid level and rim enhancement; the 2 lesions measured 2.7x2.3 cm and 4.8x2.2 cm, respectively. A small right pleural effusion and multiple lymphadenopathy of the right hilar and right interlobar regions were also present. The findings were suggestive of hematogenously spread lung abscesses.

A sputum Gram stain revealed numerous polymorphonuclear (PMN) leukocytes and rare gram-negative bacilli. A sputum aerobic bacterial culture grew gram-negative bacilli on blood agar and MacConkey agar by 3 days. The biochemical and serological tests were compatible with Salmonella spp serogroup B. Drug susceptibility tests showed resistant to quinolones but susceptibility to third generation cephalosporins and to carbapenems.

The patient was empirically treated with intravenous imipenem and was later changed to intravenous ceftriaxone. His condition gradually improved. The total duration of intravenously antimicrobial therapy was 1 month after which he was changed to oral cefdinir 400 mg/day for eight more weeks. A chest X-ray performed after 1 month of treatment (Fig 3) showed a significant decrease in size of the abscesses.

DISCUSSION

The genus Salmonella contains two species, Salmonella enterica and Salmonella bongori (Eng et al, 2015). S. enterica subspecies enterica is responsible for salmonellosis in humans (Pegues and
Miller, 2015). *Salmonella* infection spreads after ingestion of bacteria in contaminated food or water. Clinical manifestations of salmonellosis differ substantially by serotype and include acute gastroenteritis, bacteremia, enteric fever and an asymptomatic carrier state (Ispahani and Slack, 2000). Extraintestinal salmonellosis is an uncommon manifestation of non-typhoidal *Salmonella*; *Salmonella* bacteremia is found in 10-15% (Pegues and Miller, 2015). *Salmonella* spp have a propensity to infect vascular sites (Crump et al, 2015). Other infected sites include soft tissue, bones, joints, the urinary tract and the central nervous system; but these are uncommon (Wilkins and Roberts, 1988; Ispahani and Slack, 2000).

Pulmonary involvement is uncommon, found in about 10% of all extrain-
In the first case (Baird and Cap-
ppe, 1949) was a 48-year-old with no
history of co-morbid disease who
presented to the hospital with a his-
tory of prolonged fever and cough
for several weeks. A chest radiograph
revealed a right upper lung abscess.
Both blood and sputum cultures grew
S. Enteritidis. He was treated with
intravenous penicillin and sulfon-
amide. He later developed empyema
thoracis and a brain abscess. Despite
treatment, he died 4 weeks after being
admitted to the hospital. The second
case (Chan and Raffin, 1991) was a
45-year-old female diagnosed with
having Wegener’s granulomatosis
who presented with fever and cough
for 4 weeks. At that time, she was re-
ceiving prednisolone 60 mg/day and
cyclophosphamide 2 mg/kg/day. Her chest
radiograph showed a left upper lung
abscess. Fluid from bronchoalveolar
lavage grew S. Cerro while all her
blood cultures were negative. Treatment
with ampicillin was successful and her
condition resolved without complications.

The third case of Salmonella lung
abscess in a non-HIV patient is the case
we report here. Our case is similar to the
second case discussed above in that he
also had received an immunosuppressant
and presented with prolonged fever and
chronic cough. In our case, we did not
perform the Widal test because it was
unavailable and has poor diagnostic ac-
curacy (Andualem et al, 2014). The clinical
characteristics, treatments and outcomes
of the 3 cases discussed above are com-
pared in Table 1.

The primary treatment for lung ab-
scesses is a prolonged course of systemic
antimicrobials and has a treatment success
rate of 80-90% (Walters et al, 2011). Surgi-
cal drainage is an adjunct to antimicrobial

Fig 3–Chest X-ray posterior-anterior (PA) upright
view performed 1 month after treatment on-
set showing significant improvement in the
abscesses.
Table 1

Case reports of *Salmonella* lung abscesses among adult non-HIV infected patients.

<table>
<thead>
<tr>
<th>No</th>
<th>Patient</th>
<th>Comorbidities and clinical presentation</th>
<th>Serotype</th>
<th>Treatment</th>
<th>Complications and outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male, aged 48 years</td>
<td>No comorbid disease. Fever and right upper lung abscess.</td>
<td><em>S. Enteritidis</em></td>
<td>Penicillin plus sulfonamide</td>
<td>Brain abscess, deceased.</td>
</tr>
<tr>
<td>2</td>
<td>Female, aged 45 years</td>
<td>Wegener’s granulomatosis and left upper lobe lung abscess.</td>
<td><em>S. Cerro</em></td>
<td>Ampicillin for 6 weeks</td>
<td>No complications. Resolved</td>
</tr>
<tr>
<td>3</td>
<td>Male, aged 59 years</td>
<td>Focal segmental glomerulosclerosis. Multiple lung abscess.</td>
<td><em>Salmonella</em> group B</td>
<td>Ceftriaxone then oral cefdinir</td>
<td>No complications. Resolved</td>
</tr>
</tbody>
</table>

In conclusion, we reported here a rare case of *Salmonella* lung abscesses in a male patient who had been taking corticosteroids for FSGS. He had no gastrointestinal symptoms and his blood cultures were negative. He was treated successfully with systemic antibiotics without surgery. No residual complications were observed.

ACKNOWLEDGEMENTS

The authors thank the patient and his family for kindly providing consent to publish this case.

REFERENCES


