Detection of *Shigella sonnei* in a respiratory specimen in a patient with subacute atypical pneumonia

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## Introduction

The disease course of shigellosis varies widely from mild episodes of watery diarrhea to severe illness with signs of systemic toxicity with a variety of extraintestinal complications, such as bacteraemia or neurologic manifestations aside from gastrointestinal manifestations [1]. *Shigella* infections are usually spread by the fecal–oral route directly from person to person. They are highly contagious and are considered the most infectious of all bacterial enteropathogens [2] with the lowest infective dose of <100 cells [3]. Indirect transmission by fecal contamination of food or water with ingestion of feces has been reported in areas with warmer climate, particularly in developing countries. In industrialized countries with high standards of hygiene, shigellosis is usually associated with travel to endemic regions.

The classical presentation of bacillary dysentery consists of high fever, colicky abdominal pain, tenderness and high-volume watery or bloody, mucoid diarrhoea. Vomiting is present in up to 1/3 of patients [4]. Respiratory manifestations are uncommon. *S. sonnei* and *S. flexneri* infections were rarely reported to cause severe and even lethal pneumonia in malnourished infants in developing countries [5, 6] and rarely in immuno-competent [7] or immunocompromised adults [8].

## Case report

A 47-year-old man was admitted to the Department of Internal Medicine of our tertiary care hospital in Sankt Gallen, Switzerland, with a subacute worsening of a chronic cough over the last couple of weeks, and purulent non-bloody sputum production. Given a reported weight...
loss of 4 kg within the past 4 months and a smoking history of cumulative 30 pack years, the typical “red flags” were suggestive for a malignant disease and a computer tomography of the chest was performed 2 weeks prior to hospital admission. It showed a suspicious mass causing occlusion of the right posterior upper lobe bronchus segment with peribronchial infiltrates and hilar lymphadenopathy (Fig. 1). Therefore, the patient was admitted for a detailed workup of suspected lung cancer, and other differential diagnoses including infections were initially considered unlikely.

On admission to hospital, the patient was afebrile and in a very good general condition without subjective dyspnoea. Blood pressure (140/78 mmHg) and heart rate (87/min) were normal, the respiratory rate (18/min) borderline elevated with a normal O₂-saturation of 95% on room air. Pulmonary examination showed no abnormalities and there was no abdominal tenderness.

Personal history of the patient revealed that he had suffered from a myocardial infarction 15 years ago that was treated with PTCA with stenting. 2 months prior to hospital admission, he suffered from a self-limiting 1-day episode of watery diarrhoea accompanied by nausea and malaise. Before and after this 1-day episode, the patient had no gastrointestinal symptoms. There were no sick contacts, in particular no diarrhoeal episodes, among his immediate family, friends or work colleagues. Travel history was unremarkable except for a journey to the United States 6 months prior to admission with no recollection of gastrointestinal illness.

The malignancy clinical work-up was extended to a PET–CT, where the mass lesion showed a high glucose metabolic activity with infiltrates in the right posterior upper lobe segment and medially in the right apical lower lobe segment. Bronchoscopy revealed exophytic growth in the entire right main bronchus and intermediate bronchus up to the carina. The histological examination of several tissue biopsies demonstrated chronic inflammation, but no evidence of malignancy. There was no evidence of an underlying immunosuppression; HIV serology was negative. Under the assumption of a post-stenotic pneumonia, antibiotic therapy with amoxicillin/clavulanate 625 mg every 8 h per os was initiated after the bronchoscopy for 7 days. Due to lack of fever, no blood cultures were obtained. He was in a very good general condition throughout the hospitalisation and was discharged after 3 days.

Repeated outpatient bronchoscopy 2 days after discharge showed, histologically, exactly the same results as in the first endoscopy without any signs of malignancy. The patient was still in a very good general state and the antibiotic therapy was stopped as planned after a total treatment of 7 days.

In the meantime, the microbiological culture results arrived. Surprisingly, all four samples obtained over a period of 2 months, including two sputum samples and two endoscopically obtained bronchial aspirates, were consistently positive for S. sonnei, which was tested as susceptible to aminopenicillins and fluoroquinolones but resistant to folic acid antagonists. The Swiss National Reference Centre for Enteropathogenic Bacteria and Listeria (NENT) confirmed the detection of S. sonnei in all three submitted samples using standard culture- and ipaH-PCR procedures according to the guidelines of the WHO Global Foodborne Infections Network [9]. A repeated computer tomography of the chest 6 months later showed a partial regression of the mass lesions and the previously reactive lymphadenopathy. A repeated PET–CT. 2 years after initial diagnosis, showed neither the initial suspicious mass nor the hilar lymphadenopathy (Fig. 2). The patient was in an unchanged good general state of health with no more signs of cough, dyspnoea or further weight loss at 6-months and 2-years follow-up.
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Discussion

This case report should be of particular interest for clinicians because it describes an atypical case of extraintestinal shigellosis which was originally mistaken for a tumor. The most likely explanation for his illness is an unrecognized and self-limiting bacteraemia associated with his brief diarrhoeal episode or an unwitnessed episode of microaspiration. Alternatively, this might have been a previously not reported Shigella pneumonia in the absence of any gastrointestinal symptoms. Extraintestinal signs associated with S. sonnei infections are generally reported as secondary manifestations of dysentery with the route of infection due to vomiting and aspiration of mixed mouth flora containing Shigella spp. In immuno-competent adults, Shigella bacteraemia is quite uncommon and clinical presentation is often mild [10, 11]. In particular, bacteraemia is reported as a gastrointestinal complication of shigellosis in immunocompromised patients with chronic diseases as an alternative route of infection. A retrospective cohort analysis investigated Shigella bacteraemia rates over a decade in a South African population with a high HIV prevalence [12]. Between 2003 and 2006, there were 34 episodes of Shigella-associated bacteraemia documented. S. flexneri were responsible for 30 cases, 3 cases were associated with S. sonnei and 1 case with S. boydii, but unfortunately, the contribution of Shigella bacteraemia to pneumonia was not clearly recorded.

A literature review revealed very few individual case reports of shigellosis with a secondary pneumonia without or without the typical dysentery in immuno-competent or immunocompromised patients (Table 1). Interestingly, six of seven previously reported cases were due to S. sonnei as was the identified pathogen in this current report. Predisposing comorbidities to the development of Shigella bacteraemia reported in the literature include underlying malnutrition, diabetes, leukaemia, sickle cell anaemia, malignancy, organ transplantation, neutropenia and HIV. All patients recovered, except for one case report, in which the pneumonia was diagnosed without preceding gastrointestinal symptoms in an adult patient with lung cancer and diabetes mellitus that was explained by a rapidly fatal bacteremia due to the underlying disease [13].

In summary, this case illustrates the importance of a complete workup in a patient whose suspected malignancy could not be proven. We report an unusual identification of S. sonnei as the only identified pathogen from respiratory specimens which we, therefore, consider the most likely etiology of this subacute atypical pneumonia.

Compliance with ethical standards

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Conflict of interest The authors have declared that no competing interests exist.

References


Table 1 Literature review of individual case reports of shigellosis with a secondary pneumonia

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Patient age</th>
<th>Immuno-competent/ suppressed, and if yes, what; underlying comorbidities</th>
<th>Isolated or with GI illness</th>
<th>Pathogen</th>
<th>Outcome</th>
<th>Bacteraemia present/ reported</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margolin</td>
<td>2003</td>
<td>1</td>
<td>Immuno-competent</td>
<td>GI</td>
<td>S. sonnei</td>
<td>Recovered</td>
<td>No</td>
<td>Israel</td>
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<tr>
<td>Mancini</td>
<td>2009</td>
<td>69</td>
<td>Immuno-competent</td>
<td>GI</td>
<td>S. sonnei</td>
<td>Recovered</td>
<td>No</td>
<td>India</td>
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<td>Miller</td>
<td>2005</td>
<td>34</td>
<td>HIV-infection (GI)</td>
<td></td>
<td>S. sonnei</td>
<td>Recovered</td>
<td>No</td>
<td>UK</td>
</tr>
<tr>
<td>Hawkins</td>
<td>2007</td>
<td>65</td>
<td>Cancer, diabetes</td>
<td>GI</td>
<td>S. sonnei</td>
<td>Recovered</td>
<td>Yes</td>
<td>USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>69</td>
<td>Cancer, diabetes</td>
<td>GI</td>
<td>S. sonnei</td>
<td>Recovered</td>
<td>Yes</td>
<td>USA</td>
</tr>
<tr>
<td>Orr</td>
<td>2002</td>
<td>71</td>
<td>Diabetes</td>
<td>GI</td>
<td>S. flexneri</td>
<td>Recovered</td>
<td>Yes</td>
<td>Ghana</td>
</tr>
<tr>
<td>Liu</td>
<td>2009</td>
<td>62</td>
<td>Cancer, diabetes</td>
<td>Isolated</td>
<td>S. sonnei</td>
<td>Fatal</td>
<td>Yes</td>
<td>Indonesia</td>
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