tumor progression was the main cause of death (55%) in these patients [3]. Several studies show that patients with PCD receiving antitumor treatment (in combination with or without immunosuppressive therapy) live longer [1–3]. However, treatment has no effect on functional outcome. Neurological improvement is mostly anecdotal and transient since most patients show rapid deterioration even after receiving treatment [1–3]. Functional outcome is worst in PCD patients with anti-Yo antibodies, with 80–94% of the patients becoming non-ambulatory during the course of the disease [1, 3].

In the case of patients presenting with a carcinoma of the esophagus and cerebellar symptoms, metastases should first be excluded by MRI. If the MRI is negative, a paraneoplastic etiology should be considered and serum should be examined for antineuronal antibodies [15]. In the few cases reported, including ours, surgery was performed in order to give the patient a higher chance of survival with reasonable quality of life. However, because of the poor prognosis of patients with anti-Yo-associated PCD, even after complete removal/cure of the cancer, the indication of a surgical procedure with high morbidity and mortality can be debated. In our case, surgery was substantially delayed because of logistic reasons, allowing neurological deterioration to progress. If we take into account that the cancer is the most likely source of production of the Yo antigen and therefore the cause of the clinical syndrome, we believe that the tumor should be removed as soon as possible. Immediate surgery to remove the tumor upon confirmation of PCD with anti-Yo antibodies would probably be most beneficial for the patient. Further research into new and effective therapies targeting the neurological deterioration is warranted to give patients with anti-Yo-associated PCD a better chance for survival and/or a better quality of life.

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Dig Surg 2007;24:397–399
DOI: [10.1159/000107718](https://doi.org/10.1159/000107718)

Splenic Abscesses Caused by a Reptile-Associated *Salmonella* Infection

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Key Words

Salmonella infection • Splenic abscess • Surgery, splenic abscess

Abstract

Salmonella infections are not very uncommon. The source generally has to be looked for in food. The syndrome concerns mostly gastro-enteritis. We present a 17-year-old girl with sepsis caused by splenic abscesses which was successfully treated with splenectomy and antibiotics. After analysis (blood and surgical specimen samples), she appeared to be infected with *Salmonella* type Teitelkebir, a rare variant that is associated with exotic animal species, mainly reptiles. The same variant was cultivated from the faeces of the reptile pets that were held in the patients' home. We describe a case with a not often recognized source and an unusual course of *Salmonella* infection. Exotic pets can be a source of *Salmonella* infections with a catastrophic course of the disease even in healthy people.

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Fig. 1. CT of the abdomen – axial reconstruction. Multiple, partly merging hypodense lesions in the grossly enlarged spleen. Image matching with splenic abscesses.

Fig. 2. CT of the abdomen – coronal reconstruction. Multiple, partly merging hypodense lesions in the grossly enlarged spleen (craniocaudal direction 18 cm). Image matching with splenic abscesses.

Introduction

Splenectomy due to splenic abscesses is an unusual occurrence, especially in Western countries. The role of foods is a well-known phenomenon for *Salmonella* infections. Here, we want to illustrate the importance of a child's environment in the development of salmonellosis, in particular the role of home (reptile) pets.

Case Report

A previously healthy 17-year-old girl presented at the emergency department with a 2-day history of progressive left upper abdominal pain, fever, and cold shivers. The complaints started with feelings of total malaise with diarrhoea without blood or mucus infiltration. At home, she had a temperature of 39°C. Her family had a negative medical history concerning immunosuppressive diseases. No family members demonstrated signs of fever or illness. She never visited the tropics.

Physical examination presented a sick girl, length 1.73 m, weight 88 kg. The rectal temperature was 39.8°C. The blood pressure was 100/50 mm Hg and the heart rate 120/min, regular and equal. Auscultation of heart and lungs revealed no abnormalities. She had severe left upper abdominal pain, without the presence of muscular defence. The abdomen gave sparse peristalsis, with a varying tympanitic sound on percussion. The spleen was enlarged on palpation. There was no pain on palpation in the renal lodges. Skin and extremities appeared without abnormalities.

Laboratory results: white blood cells $7.4 \times 10^9/l$ (basophils $<0.1 \times 10^9/l$; eosinophils $<0.1 \times 10^9/l$; lymphocytes $0.5 \times 10^9/l$; neutrophils $5.8 \times 10^9/l$, and monocytes $0.3 \times 10^9/l$ with C-reactive protein 377 mg/l); liver and renal functions were normal, except for a lactate dehydrogenase level of 492 U/l.

A chest X-ray gave us no explanation for the clinical symptoms. Ultrasound investigation of the abdomen identified an enlarged spleen of 23.3 cm. The rest of the spleen showed multiple, partly merging hypodense lesions. The remaining organs demonstrated no abnormalities. A CT scan of the abdomen revealed multiple splenic abscesses (fig. 1, 2).

On admission, the patient was taken to the intensive care unit with the diagnosis of sepsis and multiple splenic abscesses. Empirical intravenous antibiotic treatment was started (amoxicillin with clavulanic acid 3×2.2 g and gentamicin 4 mg/kg/24 h) after obtaining blood samples. We decided to perform a laparotomy. An enlarged spleen was seen, with a fragile capsule on the lateral side which perforated during the procedure. The discharged pus was collected for culture. Splenectomy was performed. Blood samples and samples of the abscesses revealed growth of a *Salmonella* species; gentamicin was replaced by ciprofloxacin (2×400 mg i.v.). On day 4 after admission, she was transferred to the surgical ward. On day 15 she was discharged. We started vaccination 4 weeks after surgery. Until the start of the vaccination period, the patient received antibiotic prophylaxis. Thirteen months after surgery, she is doing very well.

The *Salmonella* species was typed at the National Institute for Public Health and Environment (RIVM) as *Salmonella enterica* subsp. *enterica* Telekebir which is associated with reptiles. On inquiry, it appeared that the patient had multiple different reptiles as pets. We took some faecal samples from these reptiles (a salamander and a bearded dragon), from which *S. enterica* subsp. *enterica* Telekebir was isolated.

Discussion

Salmonella species are Gram-negative, facultative anaerobic rods within the family of the Enterobacteriaceae. They can be found as commensal bacteria and are pathogenic to mammals

(including humans), reptiles, birds, and even insects. Some serovars can infect multiple hosts, others are specific for bovine animals or reptiles and only rarely cause infections in humans.

Exotic pets are often carriers of *Salmonella* species. Some studies have shown that in approximately 3–5% of the cases of *Salmonella* infection a pet is the source [1, 2]. Often it concerns turtles, Iguanidae, or snakes, but also other reptiles, birds, and mammals. Especially children, the elderly, and immunocompromised persons are at risk of infections. Unfamiliarity with the risks of contamination of the owners of the pets seems to play an important role. An information campaign carried out in Sweden reduced the incidence of reptile-associated *Salmonella* infections from 0.79 to 0.46 cases per 100,000 population [3].

During the period 1998–2005, the RIVM typed 14 human isolates of *Salmonella* as *S. enterica* subsp. *enterica* Tel-el-kebir. Two of these samples were isolated from blood cultures, one was cultured from a surgical drain, and the remaining eleven were isolated from faecal samples. Of these patients, 5 were 0–9 years old, 3 were 10–19 years old, 2 were 20–69 years old, and 4 were 70 years old or older. 3 out of the 14 patients were male.

Currently, the genus *Salmonella* consists of two species: *S. choleraesuis* or *Salmonella enterica* and *Salmonella bongori*. The first species can be subdivided into six subspecies. Among these subspecies, distinction exists in serovars according to the O, Vi, and H antigens. These serovars within *S. enterica* subsp. *enterica* bear often the name of the locality where they have occurred first, e.g., the Egyptian village of Tel-el-kebir.

Besides typhoid fever caused by *Salmonella typhi* and *Salmonella paratyphi* and gastro-enteritis caused by other *Salmonella* species, extra-intestinal infections can also occur. Other infections that have been described include endocarditis, mycotic aneurysm, infections of the central nervous system, pneumonia, osteomyelitis, arthritis, soft-tissue infections, cholecystitis, urogenital infections, and, in rare cases, splenic abscesses [4].

A splenic abscess is an exceptional disorder, and the symptoms are little specific [5]. When the diagnosis is considered, the best way to confirm is supplementary imaging (ultrasound, CT, or MRI). At present, splenectomy is the gold standard for treatment [5–7]. But ultrasound- or CT-assisted draining is an increasingly accepted method of treatment, especially in the presence of an isolated abscess [7, 8].

To conclude, exotic pets form an often unrecognized source of *Salmonella* infections which can be serious, even in apparently healthy persons.

Acknowledgement

The authors would like to thank Mrs. H. Maas of the National Institute for Public Health and Environment (RIVM) for the characterisation of the isolates and for the summary of the *S. Tel-elkebir* isolates typed in the period of 1998–2005.

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