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A Pilot with Pain in His Leg: Thigh Abscess Caused by Salmonella enterica Serotype Brandenburg

Per Björkman, Anna Nilsson, and Kristian Riesbeck

CASE REPORT

During a medium-distance flight, a 57-year-old male Caucasian pilot suddenly experienced sharp pain in his right thigh followed by fever. The patient had hypercholesterolemia and non-insulin-dependent diabetes mellitus regulated by diet. In addition, he had previously experienced mild claudicatio intermittens in his right leg and had thus been prescribed acetylsalicylic acid. On the following day, he was seen by his general physician, who found no signs of deep venous thrombosis and prescribed diclofenac for symptomatic relief. During the subsequent week, the thigh swelling increased and the fever persisted. Five days after the initial symptoms, a tender nonfluctuating mass measuring 10 by 15 cm was found in the right thigh adjacent to the groin. A fine-needle puncture of the mass yielded blood only. A week later, magnetic resonance tomography of the thigh showed an extensive swelling surrounded by soft-tissue edema (Fig. 1A and B). A pseudoaneurysm of the right femoral artery with extensive collateral circulation was identified by intravenous angiography (Fig. 1C). Empirical antibiotic therapy with difloxacillin (750 mg three times orally) was initiated. However, the patient’s condition deteriorated, and two anaerobic blood cultures were all negative. In addition, urine culture and four aerobic cultures for typhoid O antigen 12 and paratyphoid O antigens were observed. The qualitative agglutination test using specific antisera revealed that the isolate was Salmonella enterica serotype Brandenburg with the O antigens 1, 4, and 12 and H antigens i, v (phase 1), e, n, and z15 (phase 2). The organism was susceptible to ampicillin, piperacillin, cefuroxime, cefotaxime, ceftazidime, imipenem, tobramycin, co-trimoxazole, and the fluoroquinolones, and furthermore was intermediately susceptible to doxycycline as examined by disk diffusion tests (Biodisk). Fecal specimens were negative for growth of salmonella or any other pathogens, including Yersinia, Shigella, and Campylobacter spp. In addition, urine culture and four aerobic and two anaerobic blood cultures were all negative.

The patient was treated with oral levofloxacin for 3 months with no signs of recurrent infection. Interestingly, 2 weeks prior to the onset of disease, our patient had been to Tunisia, where he had experienced transient gastrointestinal discomfort without diarrhea or fever.

The bacterial organism was isolated from the abscess fluid after 4 days of incubation using aerobic flasks with liquid medium (BacT/Alert; Organon Teknika). The isolate was subcultured onto supplemented human blood agar plates containing Columbia II agar, L-cysteine, hemin, and vitamin K1. Subtyping according to Kauffmann-White (10 and references therein) using specific antisera revealed that the isolate was Salmonella enterica serotype Brandenburg with the O antigens 1, 4, and 12 and H antigens i, v (phase 1), e, n, and z15 (phase 2). The organism was susceptible to ampicillin, piperacillin, cefuroxime, cefotaxime, ceftazidime, imipenem, tobramycin, co-trimoxazole, and the fluoroquinolones, and furthermore was intermediately susceptible to doxycycline as examined by disk diffusion tests (Biodisk). Fecal specimens were negative for growth of salmonella or any other pathogens, including Yersinia, Shigella, and Campylobacter spp. In addition, urine culture and four aerobic and two anaerobic blood cultures were all negative.

To monitor the humoral immune response against the Salmonella infection, a serological analysis was done approximately 3 weeks after detection of the first symptoms. Borderline titers of 1/40 (cutoff = 1/10) for typhoid and paratyphoid O antigens were observed. The qualitative agglutination test (Bio-Rad) consisted of antigens recognizing, among others, the serotypes for typhoid O antigen 12 and paratyphoid O antigens 4 and 12, which all cross-react with serotype Brandenburg. Thus, although titers were relatively low, the serological examination supported the specific species serotype Brandenburg.

Discussion. To our knowledge, this is the first report of a muscle infection caused by serotype Brandenburg. Between 30

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and 40 cases of muscle infections caused by *Salmonella* species have been published during the last 40 years (for a review see reference 6). Extraintestinal manifestations of serotype Brandenburg are rare, and in a recent paper only two cases of bacteremia with serotype Brandenburg were found out of a total of 32 cases of *Salmonella* bacteremia (11). The low incidence of serotype Brandenburg bacteremia is reflected by the few reports on focal extraintestinal infections. However, case reports have been published on isolation of serotype Brandenburg in a ruptured abdominal aorta (3), in an ovarian cyst due to endometriosis (9), and finally in acute suppurative thyroiditis (4).

Serotype Brandenburg belongs to genomic group XVIII when defined according to biotype, serotype, and randomly amplified polymorphic DNA typing (11). Although most cases of serotype Brandenburg are sporadic, the species has also been described in national epidemics (1, 14). An extensive study in New Zealand including pulsed-field gel electrophoresis and macrorestriction fragment length polymorphism revealed that, among 115 isolates, seven clusters were defined during a 5-year time period (14).

Extraintestinal manifestations of salmonella are found mainly in immunocompromised hosts (11) or in patients with atherosclerosis. Diabetes mellitus and human immunodeficiency virus infection are the most common predisposing conditions for systemic salmonella infections (6). Salmonella is a well-recognized cause of endovascular infection in different anatomic sites, of which mycotic aneurysm of the aorta is a well-recognized cause of endovascular infection in different conditions for systemic salmonella infections (6). *Salmonella* is a common cause of endovascular infection in adults with *Salmonella* bacteremia. Ann. Intern. Med. 89:931–932.


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