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CASE REPORTS

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

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***Salmonella enterica* serotype Brandenburg is one of the more uncommon serotypes isolated from patients with gastroenteritis. Few cases of extraintestinal infections with serotype Brandenburg have been documented. The first case of a serotype Brandenburg-dependent thigh abscess originating from an atherosclerotic pseudoaneurysm of the femoral artery is reported.**

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 with expansion of the soft tissue mass and persistent fever. The patient was admitted to the hospital. On admission, the leukocyte count was 16.6×10^{9}/liter with a predominance of neutrophils, the erythrocyte sedimentation rate and C-reactive protein level were 84 mm/h and 160 mg/liter, respectively, and the hemoglobin level was 124 g/liter. Liver and renal function tests were normal. Therapy with intravenously administered cefuroxime was initiated, after which the fever disappeared; however, the soft tissue mass remained unchanged. Three weeks after onset of symptoms, an abscess in the thigh muscles with close connection to the femur was incised and drained of pus. The patient's condition improved rapidly after the surgical intervention. Culture of pus from the abscess revealed growth of *Salmonella* species strain O4. Bone scintigraphy showed no pathological uptake in the femur or elsewhere in the skeleton. 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 l, 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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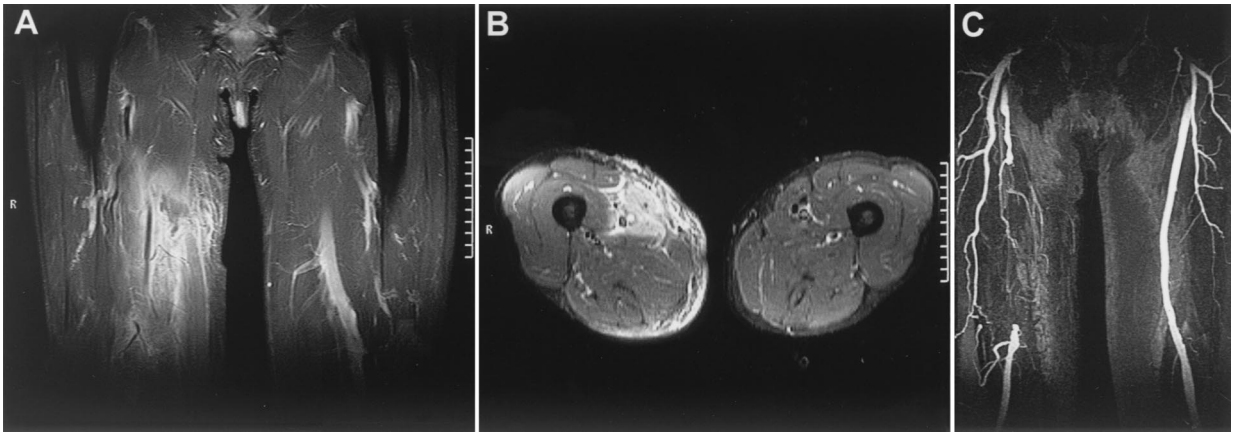

FIG. 1. Cross-sectional magnetic resonance imaging of the right thigh and angiography of the arteria femoralis and its area of distribution. An abnormal signal intensity of the psoas muscle closely approximating the groin is shown with longitudinal (A) and sagittal (B) sections. Intravenous contrast is accumulated in the infected area. An angiogram of the right arteria femoralis and its collaterals is shown (C). R, righthand side. Scale bars show centimeters.

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 considered to be the most frequent (13). Among patients above 50 years of age with non-serovar Typhi *Salmonella* bacteremia, 7 to 10% have been reported to develop arterial infection (2, 5, 12). In our patient, the muscular abscess most probably originated from an atherosclerotic plaque that had become infected during a transient bacteremic episode. The intracellular bacterium salmonella has developed a sophisticated mechanism for surviving and replicating in macrophages (8), a phenomenon that might explain the organism's preference for atherosclerotic plaques, which contain numerous phagocytic cells (7).

Our case illustrates that *Salmonella* infection has to be considered in the differential diagnosis of muscle infections, especially in patients with predisposing conditions such as atherosclerosis. Apart from surgical drainage of abscesses, correct identification of the causative organism is of utmost importance, especially for the long-term outcome of endovascular infections.

REFERENCES

1. **Baquar, N., A. Burnens, and J. Stanley.** 1994. Comparative evaluation of molecular typing of strains from a national epidemic due to *Salmonella brandenburg* by rRNA gene and IS*200* probes and pulsed-field gel electrophoresis. J. Clin. Microbiol. **32:**1876–1880.
2. **Benenson, S., D. Raveh, Y. Schlesinger, J. Alberton, B. Rudensky, I. Hadas-Halpern, and A. Yinnon.** 2001. The risk of vascular infection in adult patients with nontyphi Salmonella bacteremia. Am. J. Med. **110:**60–63.
3. **Bliss, B. P., R. N. Maini, and J. T. Scott.** 1968. Ruptured abdominal aorta infected with *S. brandenburg*. Br. Med. J. **iv:**751–752.
4. **Chiovato, L., G. Canale, D. Maccherini, V. Falcone, F. Pacini, and A. Pinchera.** 1993. *Salmonella brandenburg*: a novel cause of acute suppurative thyroiditis. Acta Endocrinol. (Copenhagen) **128:**439–442.
5. **Cohen, P. S., T. F. O'Brien, S. Schoenbaum, and A. A. Medeiros.** 1978. The risk of endothelial infection in adults with Salmonella bacteremia. Ann. Intern. Med. **89:**931–932.
6. **Collazos, J., J. Mayo, E. Martinez, and M. S. Blanco.** 1999. Muscle infections caused by *Salmonella* species: case report and review. Clin. Infect. Dis. **29:**673–677.
7. **Fazio, S., and M. F. Linton.** 2001. The inflamed plaque: cytokine production and cellular cholesterol balance in the vessel wall. Am. J. Cardiol. **88:**12E–15E.
8. **Finlay, B. B., and J. H. Brumell.** 2000. Salmonella interactions with host cells: *in vitro* to *in vivo*. Philos. Trans. R. Soc. Lond. **355:**623–631.
9. **Magliulo, E., M. Montanari, A. Dietz, and D. Torre.** 1982. The suppurative abscess of an endometriosic ovarian cyst due to *Salmonella brandenburg*. Infection **10:**172.
10. **Popoff, M. Y., J. Bockemuhl, and F. W. Brenner.** 2000. Supplement 1999 (no. 43) to the Kauffmann-White scheme. Res. Microbiol. **151:**893–896.
11. **Rodríguez, M., I. de Diego, and M. C. Mendoza.** 1998. Extraintestinal salmonellosis in a general hospital (1991 to 1996): relationships between *Salmonella* genomic groups and clinical presentations. J. Clin. Microbiol. **36:** 3291–3296.
12. **Shimoni, Z., S. Pitlik, L. Leibovici, Z. Samra, H. Konigsberger, M. Drucker, V. Agmon, S. Ashkenazi, and M. Weinberger.** 1999. Nontyphoid Salmonella bacteremia: age-related differences in clinical presentation, bacteriology, and outcome. Clin. Infect. Dis. **28:**822–827.
13. **Soravia-Dunand, V. A., V. G. Loo, and I. E. Salit.** 1999. Aortitis due to Salmonella: report of 10 cases and comprehensive review of the literature. Clin. Infect. Dis. **29:**862–868.
14. **Wright, J. M., M. Brett, and J. Bennett.** 1998. Laboratory investigation and comparison of *Salmonella brandenburg* cases in New Zealand. Epidemiol. Infect. **121:**49–55.