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Segmental Small-Bowel Gangrene Associated with *Yersinia pseudotuberculosis* Infection

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1. Introduction

Yersinia pseudotuberculosis (*Y. pseudotuberculosis*) is a gram- negative facultative anaerobe bacillus that can grow at low temperature (4°C). Consequently, the quantity of bacteria in food after several days of conservation in a refrigerator increases dramatically. It belongs, together with its homologue *Yersinia pestis*, to the family of Enterobacteriaceae. *Yersinia pseudotuberculosis* strains can be divided into 5 different serotypes. *Yersiniosis* has a wide range of clinical manifestations. The commonest is a self limiting gastroenteritis [1], but more serious variants may occur, such as appendicitis like syndrome [2] or crohn like disease [3]. We describe a small bowel necrosis associated with *Y. pseudotuberculosis* infection.

2. Case report

A 50 years old man was admitted to the emergency room with a seven day history of diffuse abdominal pain, fever, 4 time per day bloody diarrhea and weight loss. He received oral amoxicillin clavulanate two gram a day during four days without improvement. On physical examination, he had a temperature of 39 °C and a generalized abdominal tenderness to deep palpation, especially on the lower right quadrant. Laboratory work-up yielded the following: ; white blood cell count, 14.6×10⁹ L-1; C-reactive protein,150 mg L-1 (normal <5); Renal Function, electrolytes, amylasemia, Blood and urine cultures were normal. Plain abdominal roentgenogram showed small bowel gas localized in the lower right quadrant. Abdominal ultrasound and CT scan showed thickening of an ileal loop and the mesenteric wall associated with intraabdominal effusion (figure 1). On the third day of admission, severe abdominal pain developed, the abdomen was protuberant, and bowel sounds were absent. Emergency exploratory laparotomy was performed. Seropurulent effusion and necrosis involving 30 cm of the distal part of the small bowel, at about 24 centimeters from the ileocecal valve was found. The mesentery appeared thickened and there was also found an extended thrombosis of all mesentery veins, draining the area of

bowel necrosis. Resection of the necrotic small bowel was performed (figure 2) and histology showed extensive hemorrhagic necrosis affecting all the layers of the ileum and transmural inflammation of the ileum and the venous walls with neutrophils. Histological findings were not consistent with Crohn disease and no pathogenic organisms were cultured from the specimen. However, as suggested by histological findings, *Y. pseudotuberculosis* serology was performed and found positive with an antibody titre of 1/440, consistent with recent *Y. pseudotuberculosis* infection. Blood coagulation tests were normal. Tuberculin skin test and a Ziehl-Neelsen stain of the sputum for acid-fast bacilli, and serology for brucellosis and salmonellosis were negative. Antibiotic therapy with ciprofloxacin was started. On the twentieth day post surgery the patient was discharged, in good clinical conditions.

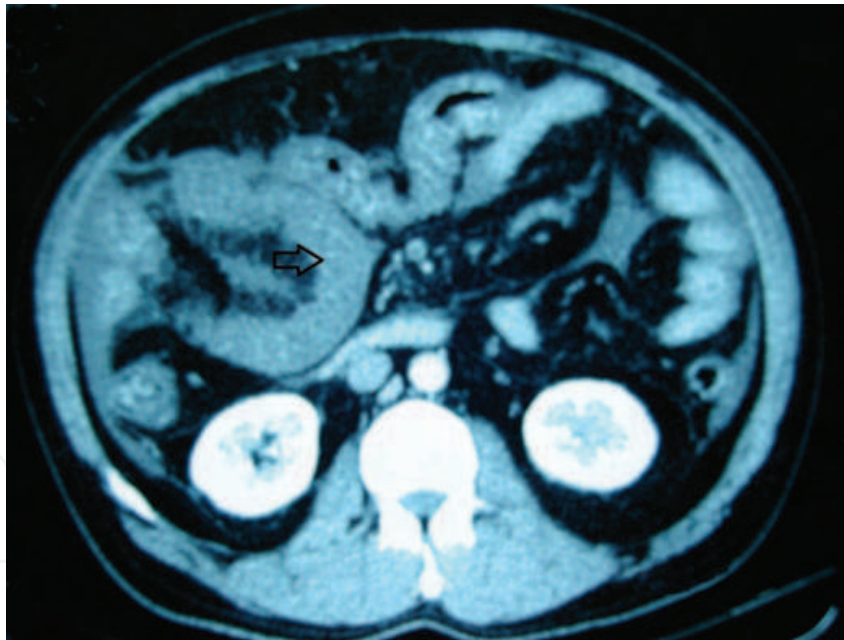


Fig. 1. Abdominal computed tomography scan with injection showing a thickened ileal loop with infiltration of its mesentery and peritoneal effusion.

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Fig. 2. Resected specimen showing necrotic ileal loop.

3. Discussion

The distribution of *Y pseudotuberculosis* infection is worldwide but it could be most commonly found in countries with cold and temperate climate. It is a bacterium isolable from the earth, from water, from a variety of foodstuffs and from human beings and animals. The animal reservoirs include many mammalian and avian hosts, such as dogs, cats, horses, cattle, rabbits, deer, rodents, and birds. An example of occupational exposure to *Y pseudotuberculosis* related to animal reservoirs involves butchers working in abattoirs slaughtering swine. *Y pseudotuberculosis* infections in humans are primarily acquired through the gastrointestinal tract after consumption of contaminated food products. Transmission may occur zoonotically, interpersonal or through consumptions of foodstuffs (in particular raw or undercooked pork products), unpasteurized milk or water not treated with chlorine. The most common manifestations of *Y. pseudotuberculosis* infection in humans are mesenteric lymphadenitis and ileocolitis accompanied by abdominal pain and fever. *Y. pseudotuberculosis* causes mesenteric lymphadenitis and may affect the appendix tissue and mimic appendicitis. Inflammation may affect the ileum and sometimes spread to the caecum simulating macroscopically Crohn's disease in its acute phase [4,5]. A mass formation, related to Y.P. infection, could occur in the right upper quadrant of the abdomen, which could be confused with tumoral lesions. Local complications due to *Y. pseudotuberculosis* have been reported rarely, such as severe bleeding, colonic perforation, subacute obstruction, and intussusceptions [6-8]. This is only one similar case of bowel necrosis following mesenteric veins thrombosis, due to *Y. enterocolitica* infection [9]. Colonic perforation and intussusception were reported in children and subacute obstruction and severe bleeding were reported in adults. We have already published a case report describing a small bowel necrosis related to *Y. pseudotuberculosis* infection [10]. Other manifestations of infection may include erythema nodosum, arthralgias, reactive arthritis, and ankylosing spondylitis. *Y pseudotuberculosis* infection has also been documented to cause lumbar facet joint disease. Acute renal failure has been reported, although very rarely. Far East scarlatinoid fever was first described in the context of *Y pseudotuberculosis* infection. A scarlatinoid-appearing rash involving the head and neck, upper and lower extremity erythema, mucous membrane enanthem, strawberry tongue and features shared with Kawasaki disease (eg, coronary artery aneurysms) characterize this syndrome. *Y pseudotuberculosis* is a gram-negative, non-lactose-fermenting coccobacillus that is chemically differentiated from other species by its fermentation of sorbitol and ornithine decarboxylase activity, among other features. The optimum growth of yersinia occurs on MacConkey medium at 20-35°C. The organism is urease-positive. Our case was negative for cultures in blood and stools, probably because of the previous antibiotic therapy. Isolation of organism from stool is difficult given the slow growth pattern and overgrowth of normal fecal flora [11]. However, stool culture yield may be increased with cold enrichment, special culture media, or alkali treatment, but these methods are generally not cost-effective [12]. Blood, peritoneal fluid, pharyngeal exudate, and synovial fluid may yield the organism. Enzyme-linked immunosorbent assay (ELISA) and agglutination tests may be obtained; the antibodies (against the O antigen) may appear soon after the onset of illness and typically wane over 2-6 months. However, cross-reaction between antibodies against other organisms may obscure the diagnostic picture. These other organisms include other *Yersinia*, *Vibrio*, *Salmonella*, *Brucella*, and *Rickettsia* species. Polymerase chain reaction (PCR) methods are sensitive, efficient, and accurate tools for identifying and serotyping *Y pseudotuberculosis*

[13]. *Y pseudotuberculosis* infection is often self-limited. However, more toxic presentations, including septic syndromes, severe dehydration, or chronic presentation, may warrant antibiotic therapy. *Yersinia enterocolitica* is susceptible to different antibiotics (aminoglycosides, tetracyclines, trimethoprim-sulfamethoxazole, ciprofloxacin) while it is in general resistant to penicillin, to ampicillin and to first-generation cephalosporin.

4. Conclusion

Yersinia may be a more important cause of acute abdominal conditions than is currently appreciated, and if specific antibody tests would have been performed routinely in every case of acute intestinal problems, the positive diagnosis of *Y pseudotuberculosis* could have been made much more commonly.

Conflict of interest

None

5. References

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Gangrene is the term used to describe the necrosis or death of soft tissue due to obstructed circulation, usually followed by decomposition and putrefaction, a serious, potentially fatal complication. The presented book discusses different aspects of this condition, such as etiology, predisposing factors, demography, pathologic anatomy and mechanisms of development, molecular biology, immunology, microbiology and more. A variety of management strategies, including pharmacological treatment options, surgical and non-surgical solutions and auxiliary methods, are also extensively discussed in the book's chapters. The purpose of the book is not only to provide a reader with an updated information on the discussed problem, but also to give an opportunity for expert opinions exchange and experience sharing. The book contains a collection of 13 articles, contributed by experts, who have conducted a research in the selected area, and also possesses a vast experience in practical management of gangrene and necrosis of different locations.

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