Case report

Septic arthritis of the knee by *Salmonella montevideo*

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We describe a case of salmonella septic arthritis of the knee in a middle-aged woman with the following predisposing conditions: long-term corticosteroids and microscopic collagenous colitis. The patient presented with enteritis caused by the same strain 3 months before the arthritis. The first series of cultures were negative and the possibility of a chronic carriage of the disease was not suspected initially. The patient was treated with antibiotics and arthroscopic washouts; the corticosteroid treatment was maintained. There was a progressive clinical and microbiological improvement and the patient was discharged 3 weeks later. *Salmonella montevideo* is a rare form of salmonella and is known to be associated with tropical fishes, reptiles and imported species.

Key words: Septic arthritis – *Salmonella montevideo*

A 59-year-old woman was admitted with a history of fever over the last few days and a painful, hot and swollen right knee. Her relevant past medical history included: (i) asthma; (ii) hiatus hernia; (iii) steroid-induced adrenal insufficiency; (iv) microscopic collagenous colitis in September 2000, which was treated with Sulphasalazine for 4 weeks only (because of allergic reactions) – in the meantime the colitis settled down; and (v) salmonella enteritis (*Salmonella montevideo*) in March 2001.

During her first admission, 1 week previously, she was apyrexial and presented with a swollen, hot, erythematous and painful right knee for which she had an arthroscopic washout. There was scanty presence of white cells and no organisms were grown after 48 h of incubation of the knee-aspirate (reactive arthritis). The value of the C-reactive protein was 33 mg/l. No blood cultures were taken at that time. She was discharged with immobilisation of the joint with an appointment for review and re-examination in 1 week.

After 5 days, the patient presented again to the accident and emergency department with similar, but more intense,

symptoms including fever of 38.8°C. Again, arthroscopic washout of the knee was carried out. After review of her past history (salmonella enteritis almost 3 months previously), salmonella infection was suspected. This was confirmed later when *S. montevideo* was cultured from the aspirate from her knee and faeces: however, blood cultures remained negative.

The patient was treated with Ciprofloxacin IV, then orally, for 6 weeks in total. Two more arthroscopic washouts were performed, the last one (2 weeks after her second admission) showed signs of articular cartilage destruction. There was slow clinical improvement and the long-term corticosteroid therapy was maintained during and after the course of antibiotics.

Discussion

The incidence of non-typhoid salmonella infections is rising steadily throughout the Western world.¹ Bone and joint involvement in salmonellosis is unusual (the

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pleuropulmonary localisations being the most frequent extra-digestive manifestations of the non-typhoid salmonellosis,² reactive arthritis being the most frequent manifestation, osteomyelitis being less common and septic arthritis rare).³ *Salmonella* can cause two types of arthritis: (i) mono-articular infectious arthritis (most cases); and (ii) polyarticular subacute reactive arthritis.⁴ The synovium is a particular metastatic focus of salmonella infection; the most frequent predisposing articular factor is avascular necrosis, the hip being the most commonly involved site. *Salmonella* spp. (more than 2000 different types) can be present in the digestive tract of man and animals in the form of infected or passive carriers. Patients with non-typhoid salmonella arthritis often have evidence of being chronic carriers since these bacteria may be isolated from stool, bile and bone marrow samples up to 7 years after an episode of salmonella arthritis.⁵ With the help of epidemiology, three groups of *Salmonella* spp. can be distinguished: (i) salmonellae with human reservoir; (ii) salmonellae with animal reservoir; and (iii) salmonellae having animal natural hosts with possible human contamination (anthropozoonosis).

Salmonella enteritis in humans presents with a spectrum of clinical syndromes that include fever, acute gastroenteritis, bacteraemia, localised infections and transient and chronic carrier states. The carrier rate is about 12 times more common in non-industrialised nations than industrialised countries.⁵ The percentage of the chronic carriers is increased with age and women become carriers nearly twice as frequently as men.⁵ There are multiple factors that contribute to salmonella bacteraemia and chronic carrier state:³⁻⁹ sickle cell disease; systematic lupus erythematosus; collagen diseases; compromised host defences (cortisone and immunosuppressants); idiopathic thrombocytopenia;⁴ alcoholic liver disease; non-specific or incomplete antibiotic therapy for any other infectious state; disorders associated with hyposplenism; AIDS; and diseases that produce an increased haemolysis. The presence of surface receptors and the electrical activity of the metalwork used in orthopaedic surgery can be another predisposing factor for a chronic carrier state.⁷ In other exceptional cases, there are no predisposing factors for this type of septic osteoarthritis. A poor outcome is often associated with a pre-existent neoplasia or immunosuppression.³

Our patient was on long-term corticosteroids and had had a short course of Sulphasalazine.

Salmonella are micro-organisms that live intracellularly and, therefore, cellular immunity is the main host defence against them (reticulo-endothelial system and mononuclear phagocytic system functions).⁵ Corticosteroids alter the leukocyte count and redistribution, suppress the migration to sites of inflammation, and decrease the response to mitogens and cytotoxicity.⁴

The clinical features and the isolation of salmonella establish the diagnosis. The isolation of the bacillus is necessary since joint aspirates can be negative (reactive arthritis) with positive cultures of the faeces and blood and painful joint swelling. In cases where salmonella osteomyelitis is present, the bacteriological diagnosis is very important since this kind of osteomyelitis is indistinguishable, clinically and radiologically, from that due to other organisms.¹⁰ Treatment consists in the use of antibiotics, after confirmation of the sensitivity by antibiogram, which have effective lymphatic concentration and without administering any bolus dose (in order to avoid the lysis of the bacteria and the liberation of a quantity of endotoxin in the blood stream). Antibiotics that have been used are: chloramphenicol; ampicillin; third generation cephalosporins; Cotrimoxazol; and fluoroquinolones. The duration of antibiotic therapy still remains empirical because of its rarity; 4-6 weeks seems to be a standard duration with possible extension, depending on the levels of the inflammatory indicators (ESR, CRP).^{5,7,10} Note that *Salmonella* spp. can acquire a plasmid-borne ampicillin resistance, the plasmid carrying the resistance to ampicillin being already present in the resident bacterial gut flora.³

The chronic carriers can carry the salmonella bacilli in their liver/hepatic biliary tract/gallbladder, intestinal tract, bone marrow, mesenteric lymph nodes, urinary tract and lungs with chronic pulmonary infection.⁵

S. montevideo (serological group CI) is known to be associated with tropical fish, reptiles and imported spices (they should be sprinkled on to raw food; cooking would kill any bacteria). Only 3 other cases have been reported in the international literature of infections other than intestinal associated with this form of salmonella.^{1,2,11} The serological group of *S. montevideo* encompasses such stereotypes as *Salmonella choleraesuis*, *Salmonella oranienburg*, *Salmonella virchow*, *Salmonella thompson*, and *Salmonella hartford* all of which have been implicated in salmonella septic arthritis.

Our patient was still in possession of a fish tank with tropical fish. Samples taken from fish food, garden pond and the interior of the fish tank from her house in May 2001 were found to be negative. However, although the samples were negative, there may well still be undetectable traces of the bacteria. The patient had also visited a pet shop 1 day before the symptoms of enteritis had developed, 3 months ago. At that time, there were no samples taken from the fish tank, the house of the patient or the pet shop and the origin of the contamination with this rare strain of salmonella still remains unknown.

Salmonella septic arthritis is a rare manifestation of salmonellosis and can be manifested to chronic carriers when predisposing conditions are present; compromised host defences, disorders associated with hyposplenism

and diseases that produce increased haemolysis. The isolation of bacillus is necessary for the establishment of the diagnosis, the antibiotic treatment, the environmental measures that need to be taken and the distinction between septic/reactive arthritis.

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