LESSON OF THE MONTH

Once bitten, twice shy!

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The incidence of infection after animal bites is increasing and can be a significant illness with many organs affected.¹ The key to successful management depends on an accurate diagnosis based on a careful history and isolation of the offending organism, followed by prompt institution of correct antibiotics and appropriate physiotherapy. To highlight this, we describe a patient who developed *Pasteurella multocida* cellulitis complicated by renal and liver disease, which led to a prolonged hospital stay.

Case report

A 74 year old widower presented with a two week history of increasing pain and swelling of the right forearm and hand with diminished range of movement of the elbow. He had given shelter to a stray cat, which had bitten him on the dorsum of the right hand three weeks previously. He was pale and unwell with a temperature of 38.5°C. The right hand and forearm were grossly oedematous and inflamed with pustule formation (fig 1). There was also a tense olecranon bursitis which restricted movement of the right elbow. Healing puncture marks were visible over the dorsum of the right hand. He had been diagnosed with rheumatoid arthritis about 30 years ago and had been treated only with non-steroidal anti-inflammatory drugs. The rheumatoid disease was quiescent, and cardiovascular, respiratory, and abdominal systems were normal.

Investigations showed a normochromic, normocytic anaemia, normal white cell count, raised erythrocyte sedimentation rate at 86 mm/1st h, slightly impaired renal function, abnormal liver function tests (alanine transaminase 784 IU/l, alkaline phosphatase 459 IU/l, γ -glutamyltransferase 161 IU/l), and hypothyroidism (thyroid stimulating hormone 92.54 mU/l, free thyroxine <2.5 pmol/l). Blood cultures were taken and samples from the bursa and pustule were sent for microscopy and culture. Initial microscopy identified plentiful white cells (reported as +++ white cells) and scanty red cells (+ red cells) in the fluid from both the bursa and the pustule and the presence of Gram negative bacilli. An ultrasound scan of the forearm showed no evidence of an abscess, but there was an effusion around the right elbow. Aspiration of the elbow joint was unsuccessful.

Initial treatment was with intravenous flucloxacillin and ampicillin, oral analgesia, arm elevation, and wound dressing. Treatment was

Figure 1 Cellulitis of the right hand and forearm.

also started with thyroxine. Once *Pasteurella multocida* was isolated from both the blood and bursal fluid on culture, flucloxacillin was stopped.

On day eight ward urine analysis showed proteinuria ++, but there was little renal impairment (urea 10.6 mmol/l, creatinine 133 mmol/l). Twenty four hour urine protein output was only 0.29 g. An ultrasound scan of the liver and renal tract was normal.

Although he became afebrile after nine days, the forearm remained cellulitic and ulcerated and required a total of three weeks' treatment with intravenous ampicillin before showing significant improvement. He received oral ampicillin 500 mg four times a day for a further eight weeks until the forearm and hand completely healed. The right elbow movement had improved within a week of taking antibiotics and, subsequently, clear fluid was aspirated

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from the elbow joint. There were + white cells in the synovial fluid, which was negative on culture. The renal and liver function tests returned to normal within a fortnight, but he needed intensive physiotherapy for another four weeks before he regained function of his right hand. Currently, he has normal renal, liver, and thyroid function.

Discussion

The incidence of infection after animal bites is high, varying in cat bites from 28% to 80% in patients presenting as emergency cases.^{2,3} *Pasteurella multocida* is a small bipolar staining coccobacillus residing as part of the normal flora in the oropharynx of many domestic and wild animals, the carriage rates in cats being as high as 90%.⁴ *Pasteurella* is a well known potential cause of infection after bites or scratches by animals, especially cats.⁵ The infection usually presents as a rapidly developing cellulitis at the site of injury. The resultant infection is serious and can progress to osteomyelitis, septicaemia, abscess formation, endocarditis, and meningitis.⁵⁻⁸ Predisposing factors include older age, compromised immune status, and animal contact.^{4,8}

This patient fulfilled the 1987 criteria for RA in that he had arthritis of three areas—arthritis of hand joints, symmetrical arthritis, and erosive changes on radiographs of hands/wrist.⁹ Infection risk among rheumatoid patients has been well documented and can contribute significantly to mortality, especially if the patient presents late.¹⁰⁻¹³ Increased severity of infections in rheumatoid patients is associated with long duration of the disease, seropositivity, extra-articular disease, corticosteroids, and immunosuppressive treatment as well as comorbid conditions such as diabetes and, rarely, hypothyroidism.¹³⁻¹⁶ Our patient had a number of risk factors, including longstanding rheumatoid disease, hypothyroidism, and, most importantly, he had been bitten by a cat. As he had such severe overlying cellulitis it was essential to exclude a septic arthritis because it might have been necessary to continue antibiotics for longer if there had been joint sepsis. Unfortunately, initial aspiration of the elbow joint was unsuccessful. At the second attempt, clear fluid was obtained from the joint and even though the patient had been receiving antibiotics for a week the reduced white cell count in the fluid and the lack of bacterial growth on culture suggested that the joint was unlikely to have been septic.

Our patient presented three weeks after the cat bite and two weeks after the onset of cellulitis, by which time there was evidence of septicaemia with renal and hepatic dysfunction. This late presentation might have led to a less favourable outcome, but the recommendation that prophylactic antibiotics be given promptly in all cases of animal bites, especially in immunocompromised patients, is debatable.⁴

Our patient was treated with ampicillin alone when *Pasteurella multocida* sensitive to the antibiotic was isolated. Recent findings, however,

have shown that 56% of infections of animal bites are mixed aerobic and anaerobic infections.⁵ As many of the anaerobes are β -lactamase producers, co-amoxiclav has been recommended as empirical treatment for infected animal bites.⁵ Even though anaerobes were not isolated from this patient's wound or blood cultures, their presence might have delayed the healing and contributed to his prolonged stay in hospital.

Lessons

- *Pasteurella multocida* can cause severe infections with dangerous sequelae and many organs may be affected.
- *Pasteurella multocida* carriage is high in cats and found to a lesser degree in dogs.
- Susceptibility to infections and also the severity of infections are increased in the rheumatoid population even if immunosuppressive drugs are not being used and should be treated promptly as significant mortality is attached.
- After infected animal bites, in view of the high incidence of mixed aerobic and anaerobic infections, co-amoxiclav is the treatment of choice, unless the patient is allergic to penicillin.

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