Findings that shed new light on the possible pathogenesis of a disease or an adverse effect

Lyme disease following a dog bite – was there a tick?

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Summary

Lyme disease is the most common tick borne infection in temperate zones and the reported incidence of the condition is increasing. Erythema migrans is one of the few clinical signs of Lyme disease and is usually indicative of recently acquired infection. A case is presented of Lyme disease with erythema migrans which followed shortly after a dog bite. The author is not aware of any previously reported similar case. The author considers that the development of Lyme disease in the case was most likely due to a coincidental tick bite which was not noticed by the patient but an alternative possibility is that the disease was activated from a latent form. Patients with Lyme disease may not give a history of tick bite and clinicians should be aware of this.

BACKGROUND

Experts agree that species of *Borrelia* bacteria occur wherever there are hard ticks and Lyme disease has the potential to occur throughout the UK. The diagnosis of Lyme disease can be straightforward where a typical bull's-eye erythema migrans (EM) rash occurs following a known tick bite but the disease can occur without recollection of a tick bite and in some cases without an EM rash.¹

This case reports Lyme disease following shortly after a dog bite. Diagnosis was made on the basis of a typical EM rash and positive IgM western blot serology. Clinicians should be aware that annular rashes presenting in the summer months can indicate Lyme disease even without a history of antecedent tick bite. The author is not aware of a previously published case report of Lyme disease following a dog bite. Speculation is made as to how the condition might have been acquired in this case.

CASE PRESENTATION

The patient, a Caucasian female aged 53, presented to the author in October 2006. In June 2006, she had sustained a dog bite to her right thigh while walking in a public park in England. The bite occurred through clothing and caused minor laceration, bruising and bleeding. The offending dog disappeared without trace. The appearances of the wound shortly after the bite are shown in figure 1. The wound was treated with cleansing and tetanus toxoid was administered to the patient. No antibiotics were prescribed.

The bite wound healed rapidly and the patient remained well until 4 weeks later when she became unwell with a flu-like illness. There were symptoms of headache, joint pains and general malaise with recurrent low grade fever. She had an exacerbation of her chronic back pain but she remained ambulant.

After a further week, the patient developed a rash over her right lower leg and subsequently similar rashes appeared more proximally over several areas of the

same leg and the opposite leg. The appearances are shown in figures 2 and 3. The appearances were considered to be typical of multiple EM. The edges of the rashes were slightly raised and warm. The rashes were not itchy or otherwise symptomatic and the epidermis was intact.

Other possible diagnoses of the skin rash include sub-acute lupus, urticarial vasculitis, annular erythema and

Figure 1 Appearance of dog bite wound on right thigh.

Figure 2 Multiple erythema migrans (EM) on right thigh.

Figure 3 EM on right lower leg.

possibly granuloma annulare. The skin rash lasted for approximately 2 weeks by which time doxycycline medication had been commenced for a diagnosis of EM. All of the skin rashes disappeared soon after commencing

doxycycline medication 100 mg twice daily but other symptoms persisted including severe lower back pain.

The medical history of the patient included euthyroid goitre since her early twenties, right acoustic neuroma

treated surgically at age 40 and chronic left temporo-mandibular joint dysfunction. No medication was being taken by the patient when she was seen. She had completed a 1 month course of doxycycline.

The patient was in full time work. She had never smoked and rarely consumed alcohol. She had been a long term UK resident but had also lived in Germany. Her hobbies included horse riding and hill walking for many years. Her mother had suffered from Alzheimer's disease but there was no other family history of note.

Physical examination at presentation revealed her to be fit looking lady with a weight of 63 kg. There was a smooth, diffuse, medium sized goitre but no other abnormalities. Her urine tested negative for blood, leucocytes, glucose and protein.

INVESTIGATIONS

Diagnostic confirmation of Lyme disease was sought with serologic testing in accordance with Centers for Disease Control and Prevention (CDC) guidelines.² Elisa screening was positive for *Borrelia* IgG and IgM. Confirmatory Western blot tests were performed which were positive by CDC criteria for *Borrelia burgdorferi* IgM. The following bands were positive: 23–25 kDa (3+), 30 kDa (1+), 39 kDa (1+), 66k Da (1+).

B burgdorferi IgG western blot was negative. Melisa lymphocyte transformation test was negative. A blood count revealed a mild leucopenia which was long standing. (neutrophil count 1.04×10^9 per litre).

The following results were within the normal range:

Urea, electrolytes, creatinine, glucose, liver function, immunoglobulins, serum electrophoresis, thyroid function, B12, folate, calcium, uric acid, lipids, erythrocyte sedimentation rate and C-reactive protein.

An auto-immune screen was negative except for antithyroglobulin antibodies which were positive at a titre of 1:1600. MRI of the lumbar spine in September 2006 showed degenerative changes most marked at the L4/5 level but there was no evidence of thecal or root compression.

The IgM western blot testing confirmed a clinical impression of the EM rash of Lyme disease. The positive western blot result was verified in three different laboratories.

TREATMENT

The Infectious Disease Society of America Guidelines for the management of Lyme disease³ recommend no more than 4 weeks of doxycycline for the treatment of early Lyme disease with EM. Other guidelines, such as those produced by the International Lyme and Associated Disease Society⁴ suggest high antibiotic doses are required and it is suggested that duration of treatment should be guided by clinical response.

In the present case since the patient remained symptomatic following 4 weeks of doxycycline and since the EM was multiple it was elected to treat the patient for 3 months with oral doxycycline at a dose of 300 mg daily.

OUTCOME AND FOLLOW-UP

The patient remained well enough to work during her period of treatment and there was no recurrence of EM. On review at 1 year, the patient reported that she had been asymptomatic apart from requiring three courses of antibiotics for dental abscesses.

Western blot tests for *B burgdorferi* performed at follow-up one year after treatment were negative by CDC criteria. Four years after the diagnosis of Lyme disease the patient reported that she had remained well apart from an episode of Herpes zoster. No further treatment for Lyme disease had been received.

DISCUSSION

This is the first published report of Lyme disease following a dog bite that the author is aware of. Spirochaetes are known to occur as commensal organisms in the mouths of mammals and it is tempting to speculate that the Lyme disease could have been transmitted directly by the dog bite. The author considers it is far more likely that transmission occurred through a coincidental tick bite which was not noticed by the patient. An alternative explanation that antigens introduced through the dog bite induced Lyme disease from a latent form warrants consideration.

Learning points

- An annular rash or rashes occurring in the summer months in Lyme endemic areas should raise a suspicion of Lyme disease. A tick bite may not be reported.
- Diagnosis should be confirmed by serologic testing but treatment should be commenced without waiting for serology results when clinical suspicion is high.
- The optimum treatment for Lyme disease is not known but doxycycline 100 mg twice daily for 2 to 4 weeks appears to be effective for EM. This may need to be extended in patients who remain symptomatic.

Competing interests None.

Patient consent Obtained.

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