COMMENTARY

Lyme carditis: a United Kingdom perspective

In 1987 an editorial in the British Medical Journal reported the spread of Lyme disease in Connecticut in the United States and stated "the rapid reporting of four cases in Britain shows that Lyme disease has now arrived in old England, too, and the disease may spread just as relentlessly". Six years on, how important is Lyme disease to cardiologists in the United Kingdom?

Lyme disease is not a newcomer to Europe. Erythema migrans, the cutaneous manifestation of Lyme disease, was described in 1910 by Aßelius a Swedish dermatologist and the neurological complications were described in France in 1922 and in Austria in 1944. Cardiac manifestations, however, were not reported until after the causative organism, the spirochaeta Borrelia burgdorferi, had been identified in 1982 by American workers investigating a cluster of cases of oligoarticular arthritis in a small New England town called Lyme.

Prevalence in the United Kingdom
In the United Kingdom the vector for B burgdorferi, Isodes ricinus, commonly known as the dog, sheep, or deer tick, and is widely distributed throughout the country. Infected ticks have been identified in many rural areas, and also in more urban places such as Richmond and Bushey Parks in London.

In the New Forest 25% of forestry workers sampled were seropositive. The average length of employment was 24 years and all had experienced frequent multiple tick bites. Between 2% and 4-5% of local inhabitants who were not directly involved in forestry work were also seropositive.

Clinical manifestations
Erythema migrans and vague systemic "flu"-like symptoms are the most common features of the acute phase of infection: but it can be asymptomatic. Neurological complications such as facial or other cranial nerve palsies, meningitis, or radiculopathy can occur in the second or early disseminated phase. The third or late phase, most commonly presents with large joint arthritis, and the chronic skin lesion acrodermatitis chronica atrophica can occur several years after infection. The chronic neurological complications of polyneuropathy, encephalopathy, or multiple-sclerosis-like syndrome are very uncommon. When cardiac manifestations occur they do so in the early disseminated phase, most commonly between three weeks and five months after infection. Frequently no history of tick bite can be elicited, but there is almost always a history of a walk in forest or parkland. Conduction disturbances are the most common cardiac manifestation. They occur in up to 87% of cases of Lyme carditis. Bundle branch block and first, second, or third degree heart block have all been described. Palpitation are commonly reported, being a symptom in 69% of cases of Lyme carditis reviewed by the Center for Disease Control in Atlanta, USA: in a few cases these were shown to be due to non-sustained ventricular tachycardia. Presentation with pericarditis, myocardiitis, or pancarditis or with the insidious development of dilated cardiomyopathy is much less common. Active infection with B burgdorferi, identified by silver staining or culture of the spirochaeta from endomyocardial biopsy, was found in 10 of 72 consecutive patients with dilated cardiomyopathy reviewed in Vienna in a unit serving an endemic area.

In the United Kingdom there has been no confirmed case of cardiomyopathy due to Lyme disease, though conduction disturbance has been described. The rarity of Lyme carditis in the United Kingdom contrasts with the North American experience where it has been estimated that 4-10% of untreated patients develop cardiac complications. There has been one report of a cardiac death attributed to Lyme disease in the United Kingdom, though it is not certain whether the positive B burgdorferi serology in this case represented past exposure or recent infection.

Diagnosis
Seropositivity alone is not sufficient to confirm a diagnosis of active Lyme disease. A positive antibody test may reflect past rather than current infection, though a high or rising titre provides useful supplementary evidence for active infection. Serological results must be interpreted in the light of the clinical presentation and history of possible exposure, which could have occurred weeks or months earlier, and maybe abroad.

By the stage at which cardiac manifestations might occur antibody titres are likely to be high enough to be detected by enzyme linked immunoassorbent assay, but immunoblot testing should also be used as a confirmatory test because cross-reactions can occur with other spirochaetal infections including oral spirochaetes and syphilis, and with other conditions such as glandular fever.

The most specific technique for confirming active Lyme carditis is culture of the spirochaeta from endomyocardial biopsy tissue. Unfortunately this method not only entails an invasive cardiological procedure, but microbiologically is also protracted, insensitive, and technically difficult because of the fastidious nature of the organism and its slow rate of replication. Histological demonstration of spirochaetes by silver staining is also relatively insensitive. Detection of spirochaetal DNA by the polymerase chain reaction is an alternative method for identifying active infection, which in expert hands provides results rapidly and is both sensitive and specific. It is not a routine diagnostic test but is available in some research centres in the United Kingdom and may be helpful in cases where there is diagnostic uncertainty.

In total approximately 200 cases of Lyme disease have been reported in the United Kingdom (N Barrett,
Therapy
In North America it is recommended that patients with suspected Lyme disease and first degree atrioventricular block of less than 0.3 should be treated with oral doxycycline or tetracycline.12 Patients with more severe conduction disturbance should be admitted to hospital, have continuous cardiac monitoring, and be treated with intravenous ceftriaxone or high dose penicillin. Any signs of progression of atrioventricular block or the coexistent development of bundle branch block are indications for temporary transvenous pacing. Ceftriaxone (2 g) as a single daily intravenous dose or intravenous benzylpenicillin 20 MU daily in divided doses should be given for 21 days. Where pericarditis is present non-steroidal anti-inflammatory agents can be combined with these agents.

In a report of nine patients with Lyme cardiomyopathy with a mean (SD) ejection fraction of 34 (2)%, six made a full recovery when treated with intravenous ceftriaxone: however, the diagnostic criteria for Lyme carditis in this study were not strictly defined.13 Prophylactic amoxycillin for those who are symptom free after a tick bite has not been shown to be beneficial.14

Conclusion
Ixodid ticks infected with *B. burgdorferi* have been identified in several areas of the United Kingdom, but Lyme carditis is rarely reported. This may be because the condition is unrecognised and undiagnosed or goes unreported. It is also possible that non-specific illnesses which may represent early Lyme disease are being treated blindly with oral antibiotics active against *B. burgdorferi*. The most likely explanation, however, seems to be that North American strains, which demonstrate some biological differences from European (including United Kingdom) strains, also have differing virulence.15-17 Arthritis and cardiac involvement are seen more often in the United States whereas neurological illness and acrodermatitis chronica atrophica have been more commonly reported in the United Kingdom. Concern about the possible "relentless spread" of Lyme disease seems unfounded.

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