

Tick Bites and Lyme disease

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This unusually warm, dry summer has encouraged countryside picnics, forest walks and hill climbing with many more people exploring the forests and braes. There are many sightings of red, fallow and roe deer as the deer population is high in many rural areas. The mild winter, wet Spring and later heat has been a bonanza for an unwelcome tenant of this environment- the tick, and some areas of Britain have become heavily infested. The tick thrives in long grasses and bracken and although preferring a deer as host for a blood meal, it happily transfers to a passing human.

Tourists to UK highland and woodland areas and parts of Europe and North America are at risk from tick bites. In the last few weeks walkers and picnickers have presented with tick bites to local doctors and nurses. GPs and casualty departments are seeing a larger seasonal increase in presentations than in previous summers. Many of those bitten do not report to health professionals as unengorged ticks are difficult to see on skin, or clothing. The bite is initially for 36 or more hours, not painful, itchy, or bleeding and does not attract host attention. After the tick is satiated with blood, it drops from the skin and only an itchy lesion, sometimes in a site not visible to the patient, remains. The general public is still poorly informed of the risk of Lyme disease. Lyme borreliosis is a bacterial infection spread to humans when bitten by an infected tick¹. People do not attach particular significance to solitary bites, commonly resulting from contact with horse flies, wasps and other biting insects, which frequent picnic spots in woodland and moor.

Health professionals too can be unaware of hazard from bites or are unsure of management. NICE guidelines focus on the presentation of a herald patch or erythema migrans for prescription of an antibiotic, but doctors and nurses do not always respond appropriately.

Recent Case Histories

An 11-year-old boy presented to an A&E Department with several tick bites and was sent home untreated, with parents assured this was a minor concern. They reported to a general practice, a few days later, when the boy had a rash round one of the bite sites. The practice nurse merely advised them on how to remove future ticks from the skin. Ten days later the patient was seen by a GP when he developed a Bell's Palsy and was referred to a consultant.

Neither the GP, nor the hospital doctor, considered Lyme disease (LD) as a cause although this was later confirmed. The condition would probably have been avoided if prompt antibiotic treatment had been instituted in primary care. If recognised promptly, and treated with appropriate antibiotics, acute Lyme disease will usually resolve without further complications. It is important to treat patients presenting with an erythema migrans rash on clinical suspicion alone, recognise other manifestations of Lyme disease and undertake relevant investigation.² Lyme disease symptoms overlap with those of many other diseases. It can be difficult to diagnose and cannot be confidently ruled out by any current test. If inadequately treated, or treated late, it may be difficult to cure.

In two other cases, a teenager had a single tick bite with the tick still attached to the leg. The insect was removed in toto, the site cleaned with antiseptic and there were no sequelae. In the second case, an elderly hill walker presented with a tale of a recent mountain climb and descent through heather and bracken. He had removed several ticks scattered across his body and legs, with one as high as the neck and sought a consultation when the score had reached 19. He did not have any localised reaction and after a few days remained free from evidence of herald patch or erythema. The guidelines decreed no antibiotic for this presentation, but the risk of later neurological manifestations would seem to be compounded with multiplicity of bites, unless immune to infection. Tests take time to confirm immunity of Lyme infection and the quandary was whether to observe, test or treat. As he was leaving for a European mountain holiday the next day, it was decided to give him a doxycycline course.

Awareness of Lyme disease

Serious sequelae from tick bites demands health professional awareness of environmental risk, identification of cause of bites and warning signs of impending Lyme disease and its clinical manifestations.^{3,4}

The bacteria that cause Lyme disease are transmitted by the bite of an infected tick, with ticks mainly found in grassy and forest areas, urban gardens and parks. They are found throughout Britain, with some areas having a high prevalence of infected ticks. Particularly high-risk areas are rural South of England, Scottish Highlands, Lowland hills and high grass and bracken areas, but infection is possible in many other regions. Tourists should be aware that Lyme disease is also prevalent in parts of central, eastern and northern Europe (including Scandinavia) and parts of Asia, USA and Canada

Tick bites may go unnoticed and most tick bites do not transmit Lyme disease. Prompt, correct removal of all of the the tick reduces risk of transmission. Covering exposed skin and using insect repellents helps protect against ticks, but they can survive showering and normal clothes washing. They are resilient and can remain on wearing apparel for six months without feeding and then transfer to skin and bite the wearer. People visiting high risk areas need to check themselves and their children for ticks on the skin and realise that they may remain unseen to the eye for many hours after exposure. The enlodged tick can often be felt with the finger when unseen to the eye.

Clinical assessment

Consider the possibility of Lyme disease in people presenting with erythema migrans, a red rash not usually itchy, hot or painful that increases in size and may sometimes have a central clearing. It usually becomes visible from 3 days to 3 months, usually from 1 to 4 weeks after a tick bite and lasts for several weeks.

A confounding factor is that a rash, which is not erythema migrans, can develop as a reaction to a tick bite. It may be caused by an inflammatory reaction or infection with a common skin pathogen and usually develops and recedes during 48 hours from the time of the tick bite. It is more likely than erythema migrans to be hot, itchy or painful.

History: If a person presents with symptoms suggesting the possibility of Lyme disease, consider duration of symptoms, possibility of tick exposure, activities exposing skin to ticks and travel to areas where Lyme disease is highly prevalent. Do not diagnose Lyme disease in people without symptoms, even if they have had a tick bite.

Lyme disease is a possibility in people presenting with several of the following symptoms:-

- fever and sweats
- swollen glands, malaise, fatigue, neck pain or stiffness, migratory joint or muscle aches and pain
- cognitive impairment, such as memory problems and difficulty concentrating
- headache
- paraesthesia
- focal symptoms and signs relating to one or more organ systems
- neurological symptoms, such as facial palsy or other unexplained cranial nerve palsies, meningitis, unexplained radiculopathy inflammatory arthritis affecting one or more joints that may be fluctuating and migratory
- cardiac problems, such as heart block or pericarditis
- eye symptoms, such as uveitis or keratitis
- skin rashes

Be cautious about diagnosing Lyme disease in people without a supportive history or positive serological testing because of the risk of providing inappropriate treatment. Consider starting treatment with antibiotics while waiting for the results if there is high clinical suspicion.

Laboratory investigations

Diagnose and treat Lyme disease without laboratory testing in people with erythema migrans. Use a combination of clinical presentation and laboratory testing to guide diagnosis and treatment in people without erythema migrans. Do not rule out diagnosis if tests are negative but there is high clinical suspicion of Lyme disease.

Information for people being tested for Lyme disease

Tests for Lyme disease have limitations. Both false-positive and false-negative results can occur. Most tests for Lyme disease assess for the presence of antibodies and accuracy of tests may be reduced if testing is carried out too early (before antibodies are produced).

Tests

If there is a clinical suspicion of Lyme disease in people without erythema migrans: consider an enzyme-linked immunosorbent assay (ELISA) test for Lyme disease and test for both IgM and IgG antibodies using ELISAs based on purified or recombinant antigens derived from the VlsE protein or its IR6 domain peptide (such as C6 ELISA).

If the ELISA is positive or equivocal: perform an immunoblot test for Lyme disease and if the ELISA for Lyme disease is negative and the person still has symptoms, review history and symptoms, and alternative diagnosis.

If Lyme disease is still suspected in people with a negative ELISA who were tested within 4 weeks from symptom onset, repeat the ELISA 4 to 6 weeks after the first ELISA test. If Lyme disease is still suspected in people with a negative ELISA who have had symptoms for 12 weeks or more, perform an immunoblot test. Diagnose Lyme disease in people with symptoms and a positive immunoblot test. If the immunoblot test for Lyme disease is negative (regardless of the ELISA result) but symptoms persist, refer to a specialist appropriate for the person's history or symptoms. If the immunoblot test for Lyme disease is negative and symptoms have resolved, explain to the person that no treatment is required.

NICE has produced a visual summary of the recommendations on testing for Lyme disease.⁵

TREATMENT

Antibiotic treatment if diagnosed with Lyme disease. See (Table 1)

For adults and young people (aged 12 and over) antibiotic treatment according to symptoms.

Table 1 Antibiotic treatment for Lyme disease in adults and young people (aged 12 and over)

(NICE Guidelines April 2018)

Symptoms	Treatment	First alternative	Second alternative
Lyme disease without focal symptoms			
Erythema migrans and/or Non-focal symptoms	Oral doxycycline: 100 mg twice per day or 200 mg once per day for 21 days	Oral amoxicillin: 1 g 3 times per day for 21 days	Oral azithromycinb: 500 mg daily for 17 days
Lyme disease with focal symptoms			
Lyme disease affecting the cranial nerves or peripheral nervous system	Oral doxycycline: 100 mg twice per day or 200 mg once per day for 21 days	Oral amoxicillin: 1 g 3 times per day for 21 days	–

Lyme disease affecting the central nervous system	Intravenous ceftriaxone: 2 g twice per day or 4 g once per day for 21 days (when an oral switch is being considered, use doxycycline)	Oral doxycycline: 200 mg twice per day or 400 mg once per day for 21 days	–
Lyme disease arthritis	Oral doxycycline: 100 mg twice per day or 200 mg once per day for 28 days	Oral amoxicillin: 1 g 3 times per day for 28 days	Intravenous ceftriaxone: 2 g once per day for 28 days
Acrodermatitis chronica atrophicans			
Lyme carditis	Oral doxycycline: 100 mg twice per day or 200 mg once per day for 21 days	Intravenous ceftriaxone: 2 g once per day for 21 days	–

Non pregnant women (including young women under 18): antibiotic treatment. If symptoms worsen during treatment, assess for an allergic reaction to the antibiotic. Jarisch–Herxheimer reaction may cause an exacerbation of symptoms but does not usually warrant stopping treatment.

Review during or after treatment for Lyme disease to assess for possible side effects and response to treatment.

Conclusion

Tick bites are common with a high prevalence of ticks in certain areas of Britain Europe and the USA. Travellers and tourists, hill walkers, picnickers, should be aware of the risk, take precautions to avoid bites, remove the tick completely as soon as they are aware of it. Always seek medical aid if a rash occurs in the affected within a few weeks of the bite.

Be aware that Lyme disease can result from a tick bite, but prompt appropriate antibiotic therapy after a bite with sequelae can reduce the risk of Lyme Disease development.

References

- 1 Public Health England. Lyme disease: signs and symptoms. Accessed online 9 August 2018. <https://www.gov.uk/government/publications/lyme-disease-signs-and-symptoms>
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- 4 British Infection Associaton. Epidemiology and presentation of Lyme borreliosis 2011 J of Infection. 62 329-338
- 5 NICE Guidance: Lyme Disease. Accessed on 9 August 2018. <https://www.nice.org.uk/guidance/ng95/chapter/recommendations#management>

Further Reading

1. Shapiro.E, Wormser, G. Lyme Disease in 2018. What is new (and what is not): <https://jamanetwork.com/journals/jama/fullarticle/2696480>