



Lyme Disease and Aircrew Health

Ticks, small insects found outdoors, but commonly associated with pets, can cause infections capable of grounding pilots. Only recently identified, Lyme disease is an illness carried by specific ticks and it can be diagnosed incorrectly and cause the grounding of a pilot. During treatment for illness, patients need to inform their physicians if they know they were bitten by ticks, or if they were outdoors in a tick-infested area. Once identified, treatment is straightforward and effective.

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by

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Introduction

Lyme disease is an infectious condition that was unrecognized until recently. Victims were misdiagnosed as having one or more of a variety of serious conditions that result from noninfectious causes. These causes ranged from mental disease, through myocardopathy to migratory polyarthritis. Since Lyme disease in its early phases, and, often in its later phases, can be cured with suitable antibiotics, a specific diagnosis is very important to the victim.

The Lyme infection can last for years, even decades, and keep any suffering aircrew members grounded for years, if not permanently. Treatment with specific antibiotics is simple, effective and curative. Full recovery is possible if the treatment is given before permanent tissue damage occurs.

Historical Aspects

In the mid 1970s, persons living in and around Lyme, Connecticut, U.S., were found to have rheumatoid arthritis in case numbers that, on the basis of population, exceeded levels recorded for other parts of the country. Persons in virtually all age groups were involved, with children showing the rheumatoid arthritis at a level 100 times above that found in many

other communities. The geographic clustering in eastern Connecticut was first reported by Steere and Associates in 1977 (1). It was found that the cases often clustered in wooded areas and that the illness was frequently initially noted in the summer to fall period. A fourth of those who became ill could recall suffering a transitory skin rash of the type that often spreads around an insect bite.

Those studying the clustering of the arthritis cases in the Lyme area referred to the condition as "Lyme arthritis." When it was later recognized that many body systems were involved, the name, Lyme disease, was introduced. Frequently, the first sign of the disease is an expanding skin rash that is known medically as erythema chronicum migrans. A spirochete was isolated in 1982 from an adult deer tick (*Ixodes damini*) by Bergdorfer and Associates (2). The spirochete has been named *Borrelia burgdorferi*.

Distribution of Lyme Disease

The newly identified spirochetal disease has recently been discovered in many parts of the world (3). In the northeastern U. S., numerous cases have been diagnosed in Connecticut, Massachusetts, New York, Pennsylvania and Maryland. Cases have now been diagnosed in the midwest, especially Min-

nesota and Wisconsin, and, in the west, in Nevada, Oregon and California. More than 25 U.S. states have confirmed reports of Lyme disease. Many cases are being diagnosed in Europe, Soviet Union and Australia. Retrospective studies are showing that the disease can be confirmed to have existed in Lyme, Connecticut in 1965 and Cape Cod, Massachusetts in 1962.

Animal Host and Tick Vector of Lyme Disease

A tick in the Ixodid tick category, was discovered to be the culprit that transmitted the spirochete from a host animal to the human victims. The tick playing this role in the transmission of the infectious spirochete is referred to as the vector.

To understand the process of disease transmission, it must be understood that ticks go through a series of successive stages from an early individual form, known as a nymph, which is quite small, to the larger adult form. The vector in the process is the nymph stage of the tick, wherein the tick is about the size of a small grain of sand or, as described by some, a grain of table pepper. This small-sized tick in the Connecticut area prefers the white footed mouse as a feeding target. The *Borrelia burgdorferi* spirochete has been found infecting these white footed mice. It is also known that the adult tick prefers the white tailed deer to which the adults often attach in large numbers. The spirochete is found as well in a variety of rodents and birds. Public health physicians refer to the animals harboring the spirochete as the reservoir, and the human victim as the host.

Disease Progression

The early appearance of Lyme disease occurs within three to 32 days of the bite by an infected immature tick. The first sign is often a reddish rash that begins where the tick bit the skin, and may expand to 20 inches or more in an area. Multiple rings of skin redness may occur, and the rash may involve the armpits, the groin area or the areas around the thigh. Most victims feel very tired and may have headaches, chills, fever and joint pains.

Several weeks or longer after the initial symptoms, about one in six victims develop meningitis. Sometimes, facial paralysis and other neurological symptoms (including "Bell's Palsy") may develop and remain present for a year or more. About one in 10 victims develop cardiac problems, including myocarditis, atrioventricular block, and, occasionally, cardiac enlargement. These problems may last more than a month.

More than half of the victims develop arthritis with swelling and joint pain in the large joints. This occurs from a few weeks to two years or so following the initial skin rash symptoms. Small joints may also be attacked, and the arthritic effects may appear in the bones of hands. These arthritic

attacks (known as polyarthritis) may continue for years. If not diagnosed, cartilage may be destroyed with permanent adverse joint effects.

Treatment

Penicillin is rapidly curative for Lyme arthritis (of course, if permanent joint damage has occurred, penicillin will not cure this [4]). Any one of the antibiotics, tetracycline, penicillin or erythromycin, also produce a complete cure if given in the early stages of the disease. The physician can tell from serum antibody titers to the spirochete if Lyme disease is a likely cause of the patient's symptoms. In the early stages of the disease, oral antibiotics are generally used. In more complex or advanced stages, intravenous penicillin is used.

Aircrew Preventive Measures

Preventive measures include exercising tick avoidance procedures when entering any area, especially wooded areas, having tick infestations. The use of long sleeved clothing and arthropod repellents (on clothing and skin in accordance with the manufacturer's directions), along with frequent checks for small ticks (especially around the belt-line and thigh area), comprise important preventive measures. Any tick found should be carefully removed. Small ticks can be pulled off with tweezers. Gentle persistent tugging is important so that the head and mouth parts aren't left locked in the skin. Even if ticks aren't found, aircrew should note any skin rashes that develop the characteristic bulls-eye pattern of an infected tick bite.

Concluding Comments

Aircrew members should be sensitive to the signs and symptoms of Lyme disease. They should be alert for these after being in tick infested areas or after receiving a tick bite.

Well-informed persons can help the physician by relating the possibility of tick bites and the possible presence of Lyme disease. The physician can make diagnostic neurologic tests and give the proper antibiotic treatment if tell-tale levels of an immune response to the *Borrelia burgdorferi* spirochete are present. ♦

Reference

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