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Babesiosis : A Short review

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ABSTRACT

Babesiosis or piroplasmosis is a malaria-like parasitic disease caused by infection with a eukaryotic parasite from the order Piroplasmida, typically a Babesia or Theileria from the phylum Apicomplexa. Human babesiosis is mainly transmitted by tick bites in the Northeastern and Midwestern United States, as well as parts of Europe, with occasional transmission elsewhere. When the weather is warm, this happens. Babesia parasites can be transmitted to humans through the bite of an infected tick, a blood transfusion from an infected blood product donor, or congenital transmission from a mother to her child. Ticks spread babesiosis, and it often coexists with other tick-borne diseases, such as Lyme disease. After trypanosomes, babesia is thought to be the second most common blood parasite in mammals. Mild winters may have a substantial negative effect on the wellbeing of domestic animals in mild climates. The disease Texas cattle fever, also known as redwater fever, affects cattle.

Keywords: Babesiosis, Eukaryotic parasite, Infant, Lyme disease.

INTRODUCTION

Microscopic parasites infect red blood cells, causing babesiosis. Babesia microti is the parasite that causes the majority of human Babesia infections in the United States. There have been a few cases of Babesia caused by other species (types). Ixodes scapularis ticks spread Babesia microti in the wild (also called blacklegged ticks or deer ticks). Tickborne transmission is most common in specific areas and seasons: it is most common in parts of the Northeast and upper Midwest, and it peaks in the summer. The severity of a Babesia infection can range from asymptomatic to life-threatening. The infection can be treated and avoided. [1] [2], [Fig 2].

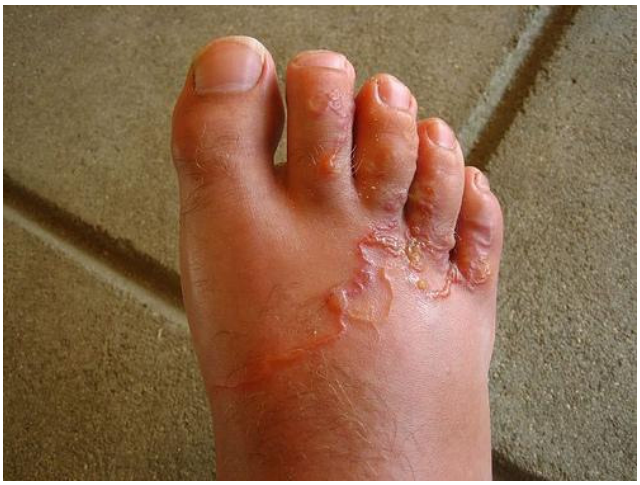

Fig 1: Babesiosis

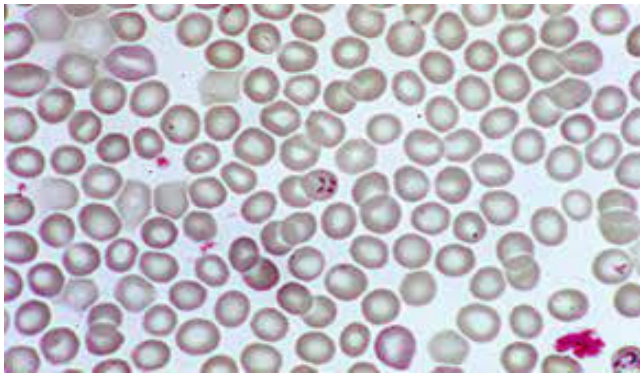

Fig 2: Babesiosis

HISTORY

The disease is named after the causative organism's genus, which was named after romanian bacteriologist victor babeş[3]. Victor babeş discovered that microorganisms in red blood cells cause febrile hemoglobinuria in cattle in 1888. [4] ticks were discovered to be the vector for transmission in texas cattle by theobald smith and frederick kilborne in 1893. B. Bigemina was the agent. This was the first time an arthropod was shown to be capable of transmitting an infectious agent to a vertebrate host.

A splenectomized Croatian herdsman was the first human case reported in 1957. [number four] B. divergens was the agent. On Nantucket Island in 1969, the first case was identified in an immunocompetent individual. B. microti was the agent, and I. scapularis was the vector. [requires citation] Piroplasmosis (from the Latin piro, meaning pear + Greek plasma, a thing formed) is another name for equine babesiosis (caused by the protozoan Theileria equi). (5)

EPIDEMIOLOGY & RISK FACTORS

Babesia parasites can infect people in a variety of ways: The most common method is to be bitten by an infected tick while participating in outdoor activities in areas where babesiosis is present (see below). A less popular method is to receive a blood transfusion from a blood donor who has a Babesia infection but is symptomless. (At this time, no tests for Babesia infection in blood donors have been approved.) There have been a few reports of congenital transmission from an infected mother to her baby (during pregnancy or delivery). Babesia parasites are not spread from person to person in the same way as the flu or the common cold are.

Babesia parasites have been found in several different species (types) in animals, but only a few have been found in humans. The most common species found in people in the United States is Babesia microti, which infects white-footed mice and other small mammals. Babesiosis caused by other Babesia species has been recorded on a sporadic basis. Ixodes scapularis ticks transmit Babesia microti in the wild (also called blacklegged ticks or deer ticks). [6-8]

Tickborne transmission is most common in the Northeast and upper Midwest, especially in New England, New York, New Jersey, Wisconsin, and Minnesota. The parasite is usually transmitted by the tick's young nymph stage, which is most likely to be found (seeking or "questing" for a blood meal) in areas with trees, brush, or grass during the warm months (spring and summer). Since I. scapularis nymphs are so tiny, infected people do not remember being bitten by a tick (about the size of a poppy seed) [9-10], [Fig 3].

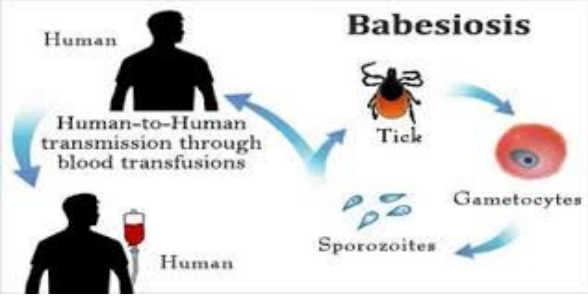

Fig 3: transmission of Babesiosis

CAUSES

Infection with a malaria-like parasite of the genus Babesia causes babesiosis. Nuttalia is another name for the Babesia parasite. The parasite develops and reproduces within the infected person's or animal's red blood cells, causing severe pain due to red blood cell breakup. Babesia parasites come in over 100 different species. According to the Centers for Disease Control and Prevention (CDC) Trusted Source, Babesia microti is the most commonTrusted Source strain infecting humans in the United States. Cattle, horses, sheep, pigs, goats, and dogs are among the animals that may be infected by other strains. [10],[11].

SIGNS & SYMPTOMS

Babesiosis symptoms can range from mild to severe. You may have no symptoms at all or have mild flu-like symptoms. Some situations may result in life-threatening complications. A high fever, chills, muscle or joint aches, and fatigue are common symptoms of a Babesia infection. Extreme headaches, stomach pain, nausea, skin bruising, skin and eye yellowing, and mood swings are some of the less common symptoms. You can experience chest or hip pain, shortness of breath, and drenching sweats as the infection progresses. It's possible to have Babesia infection without showing any signs or symptoms. A recurrent high fever may indicate undiagnosed babesiosis. Extremely low blood pressure, liver problems, hemolytic anaemia (the breakdown of red blood cells), kidney failure, and heart failure are all possible complications.

Symptoms of malaria, such as fevers up to 40.5°C (105°F), trembling chills, and extreme anaemia, can occur in more severe cases (hemolytic anemia). Organ failure, including adult respiratory distress syndrome, is a possibility. Sepsis can develop quickly in people who have undergone a splenectomy, as a result of an overwhelming post-splenectomy infection. Severe cases are more common in the very young, the very old, and people with immunodeficiency, such as HIV/AIDS patients.

A reported increase in human babesiosis diagnoses in the 2000s is thought to be caused by more widespread testing and higher numbers of people with immunodeficiencies coming in contact with ticks, the disease vector.[12] Little is known about the occurrence of *Babesia* species in malaria-endemic areas, where *Babesia* can easily be misdiagnosed as *Plasmodium*. Human patients with repeat babesiosis infection may exhibit premunity.[13]

PATHOPHYSIOLOGY

Babesia parasites replicate in red blood cells as cross-shaped inclusions (four merozoites asexually budding, but attached together in a structure that resembles a "Maltese cross")[14] and cause hemolytic anaemia, which is similar to malaria. Babesia species, unlike Plasmodium parasites that cause malaria, do not have an exoerythrocytic phase, so the liver is rarely affected. Babesia canis rossi, Babesia bigemina, and Babesia bovis cause especially serious forms of the disease in nonhuman animals, including severe haemolytic anaemia and a positive erythrocyte-in-saline-agglutination test, suggesting an immune-mediated aspect to the haemolysis. Haemoglobinuria "red-water," disseminated intravascular coagulation, and "cerebral babesiosis," induced by erythrocyte sludging in cerebral capillaries, are all common complications. Since the organism causes hemolytic anaemia in bovine mammals, an infected animal's mucous membranes appear pale at first. The failure of the liver to metabolise the excess bilirubin causes the visible mucous membranes to turn yellow (icterus) as the levels of bilirubin (a byproduct of red blood cell lysis) rise. Hemoglobinuria is caused by the kidneys excreting red-blood-cell lysis byproducts. The release of inflammatory byproducts causes a fever of 40.5 °C (105 °F). [Fig 4]

DIGANOSIS

Babesiosis is a disease that can be difficult to detect. Babesia parasites can be identified early on by looking at a blood sample under a microscope. Blood smear microscopy diagnosis takes a long time and needs a lot of skill. If there is a very low level of parasitemia in the blood, smears may be negative, particularly early in the disease, and they will need to be replicated over several days. If you or your doctor believes you or your child has babesiosis, your doctor will conduct further testing. They can request a blood sample for an indirect fluorescent antibody test (IFA). On the blood sample, molecular diagnostics such as polymerase chain reaction (PCR) may be used. [15]

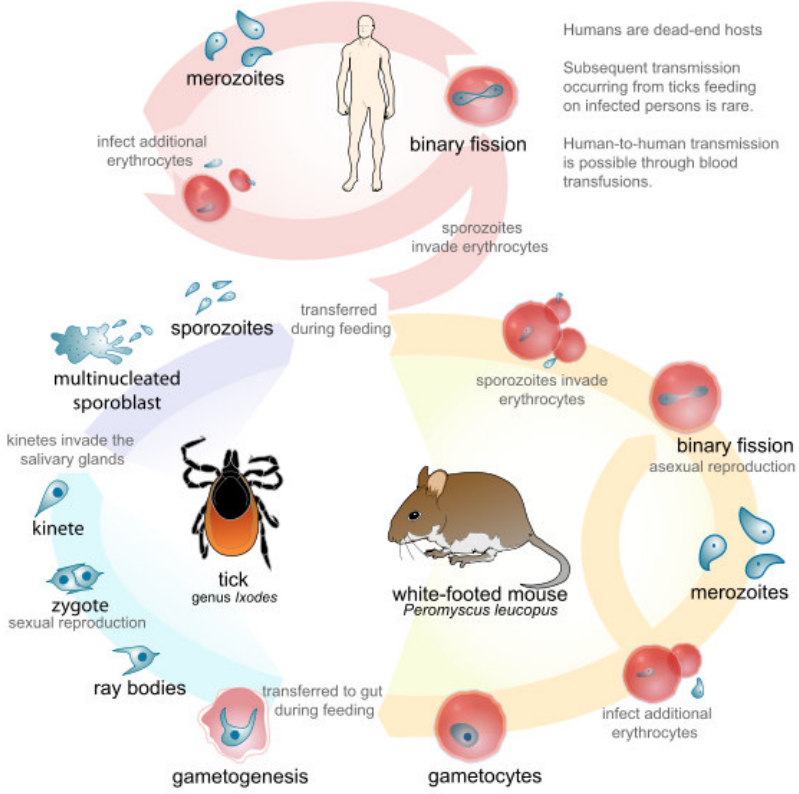

Fig 4: Pathophysiology

TREATMENT

Babesia is a parasite that is resistant to antibiotics. Antiparasitic drugs, such as those used to treat malaria, are needed for treatment. Many mild to moderate cases are treated with atovaquone plus azithromycin, which is normally taken for 7 to 10 days. Clindamycin plus quinine is an alternative treatment option. Treatment for serious disease typically consists of intravenous azithromycin combined with oral atovaquone or intravenous clindamycin combined with oral quinine. Additional supportive services, such as blood transfusions, can be used in cases of serious illness. It's likely that you'll have a relapse after care. If you experience symptoms again, you must seek treatment. Some people, such as those with compromised immune systems, may need more time to clear the infection at first. [16]

PREVENTION & CONTROL

Steps can be taken to reduce the risk for babesiosis and other tickborne infections. The use of prevention measures is especially important for people at increased risk for severe babesiosis (for example, people who do not have a spleen). Avoiding exposure to tick habitats is the best defense.

Babesia microti is spread by *Ixodes scapularis* ticks, which are mostly found in wooded, brushy, or grassy areas, in certain regions and seasons. No vaccine is available to protect people against babesiosis. However, people who live, work, or travel in tick-infested areas can take simple steps to help protect themselves against tick bites and tickborne infections.

Take care to keep ticks off the skin when participating in outdoor activities in tick-infested areas. To avoid contact with leaf litter, brush, and overgrown grasses, which are where ticks are most likely to be found, walk on cleared paths and remain in the middle of the trail. Wear socks, long trousers, and a long-sleeved shirt to reduce the amount of exposed skin. Tuck your pant legs into your socks to prevent ticks from crawling up the inside of your pants. Wear light-colored clothing to help you spot ticks and catch them until they stick to your skin. Using repellents on both your skin and your clothes. Follow the product label's guidance. DEET (N,N-diethylmetatoluamide)-containing products may be applied directly to exposed skin and clothing to help keep ticks at bay (by repelling them). The repellent's product label provides instructions about how to apply it, when to apply it, how frequently to reapply it, and how to use it safely on children. Permethrin products can be applied to clothing/boots (but not to skin), and they kill ticks that come into contact with them. They also normally last many washings.

Conduct regular tick tests during outdoor activities and eliminate any ticks that are discovered as soon as possible. Tick inspections should be done on a regular basis. The B. microti-spreading I. scapularis nymphs are so small (about the size of a poppy seed) that they are easily ignored. They must, however, remain attached to a human for at least 36-48 hours in order to transmit the parasite. Before going indoors, remove ticks from your clothing and pets. Examine the whole body for ticks. To view all aspects of the body, use a hand-held or full-length mirror. Check behind the knees, between the legs (groin/thighs), between the toes, under the arms (armpits), around the hips, within the belly button, behind and in the head, as well as the scalp, hairline, and hair. Remember to keep an eye on your children and pets as well. Ticks attached to the skin should be removed as soon as possible, preferably with pointed (fine-tipped)

tweezers. Pull the tick straight out (with steady external pressure) before it lets go.. [17].

REFERENCES

1. Human babesiosis, Maine, USA, 1995–2011.. Smith R, Elias SP, Borelli TJ, et al. Emerg Infect Dis 2014;20(10):1727-30.
2. Babesia microti infection, eastern Pennsylvania, USA. Perez Acosta ME, Ender PT, Smith EM, Jahre JA. Emerg Infect Dis 2013;19(7):1105-7.
3. "babesia" at Merriam-Webster online.
4. Vannier, Edouard; Krause, Peter J. (21 June 2012). "Human Babesiosis". New England Journal of Medicine. 366 (25): 2397–2407. doi:10.1056/NEJMra1202018.
5. Definition of Piroplasma". lexic.us. Retrieved November 9, 2011.
6. Babesiosis in Lower Hudson Valley, New York, USA. Joseph JT, Roy SS, Shams N, et al. Emerg Infect Dis 2011;17(5):843-7.
7. Babesiosis in immunocompetent patients, Europe. Martinot M, Zadeh MM, Hansmann Y, et al. Emerg Infect Dis 2011;17(1):114-6.
8. Fatal babesiosis in man, Finland, 2004. Haapasalo K, Suomalainen P, Sukura A, Siikamaki H, Jokiranta TS. Emerg Infect Dis 2010;16(7):1116-8.
9. Babesiosis acquired through blood transfusion, California, USA. Ngo V, Civen R. Emerg Infect Dis 2009;15(5):785-7.
10. Natural transmission of zoonotic Babesia spp. by Ixodes ricinus ticks. Becker CA, Bouju-Albert A, Jouglin M, Chauvin A, Malandrin L. Emerg Infect Dis 2009;15(2):320-2.
11. Babesia divergens-like infection, Washington State Herwaldt BL, de Bruyn G, Pieniazek NJ, et al. Emerg Infect Dis 2004;10(4):622-9.
12. Hunfeld KP, Hildebrandt A, Gray JS (2008). "Babesiosis: Recent insights into an ancient disease". Int J Parasitol. 38 (11): 1219–37. doi:10.1016/j.ijpara.2008.03.001
13. Shaw, Susan E.; Day, Michael J. (11 April 2005). Arthropod-borne Infectious Diseases of the Dog and Cat. Manson Publishing. p. 71. ISBN 978-1-84076-578-6.
14. Krause PJ, Telford S, Spielman A, et al. (November 1996). "Comparison of PCR with blood smear and inoculation of small animals for diagnosis of Babesia microti parasitemia" (PDF). J. Clin. Microbiol. 34 (11): 2791–4.
15. Diagnosis, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: a review.external icon Sanchez E, Vannier E, Wormser GP, Hu LT. JAMA 2016;315:1767–77.
16. Wormser GP, Dattwyler RJ, Shapiro ED, et al. The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: clinical practice guidelines by the Infectious Diseases Society of America. Clin Infect Dis 2006;43:1089-134. Erratum in: Clin Infect Dis 2007;45:941.
17. Conrad PA, Kjemtrup AM, Carreno RA, et al. Description of *Babesia duncani* n.sp. (Apicomplexa: Babesiidae) from humans and its differentiation from other piroplasms. Intern J Parasitol 2006:36:779-89.

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