



Update on blood parasites: What is new?

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Globalization has allowed us to move horses around the world, but just as we transport equids, they move diseases and vectors. Within the category of blood parasites that affect horses include Piroplasmosis and Ehrlichiosis. Piroplasmosis represents a challenge for veterinarians, since it is a challenge to avoid transmission, recognize asymptomatic carriers and treat infected horses.

Equine piroplasmosis

Equine piroplasmosis is an infectious, tick-borne disease caused by the hemoprotozoan parasites *Theileria* (previously *Babesia*) *equi* and *Babesia caballi*. According to the Office International des Epizooties/The World Organization for Animal Health (OIE), most of the equid-inhabited regions of the world are considered endemic for infection and disease and it is a notifiable disease according to the OIE list. Horses that suffer piroplasmosis has clinical presentation related to intravascular hemolysis and associated systemic illness, such as: anemia, icterus, pale mucous membranes, fever, ventral edema, pigmenturia and trombocitopenia.

We can consider several forms of clinical presentation:

- Acute. Nonspecific signs of a high fever, lethargy, anorexia, peripheral edema, and petechiations of the mucous membranes. As the disease progresses the clinical signs derived from intravascular hemolysis become more evident (icteric or pale mucous membranes, tachycardia, tachypnea, weakness, and pigmenturia).
- Peracute. Cases of fulminating forms have been described that cause collapse and sudden death. This form is very rare and usually occurs in horses that have never had previous contact with the disease and almost never appears in horses that live in endemic areas.
- Chronic. may result in nonspecific signs of chronic inflammation or infection including lethargy, partial anorexia, weight loss, poor hair coat, and poor performance. Mild anemia may be present.

Traditionally, carrier horses have been considered to have splenomegaly and it was also considered that carrier horses could present loss of sports performance as a result of anemia, something that does not seem to occur, at least in endemic areas.

Diagnosis

To achieve the definitive diagnosis of infection is needed to perform serologic testing at a certified laboratory under the guidance of the regulatory officials involved. The tests that are used more frequently in the diagnosis of piroplasmosis are:

- Direct observation of the smear with direct microscopy, only positive during the acute stage of infection, when the horse has fever (Figures 1 and 2).
- Complement fixation test (CFT).
- Indirect immunofluorescence assay (IFA). The IFAT is considered to be more sensitive than the CFT during chronic infection and it remains one of the prescribed tests for equine piroplasmosis recommended by the OIE.
- Western blot (WB).
- Competitive enzyme-linked immunosorbent assay (cELISA). It is the other regulatory test approved by the OIE for international horse transport and it is considered to be the most sensitive test for chronic or inapparent *T. equi* infection.
- PCR (only positive in acute cases).

In endemic areas, treatment is usually aimed at alleviating clinical signs and accelerating the recovery of the horse, although it is assumed that the horse may remain as an inapparent carrier.

In these cases it is not recommended clearing the parasite as it can pose problems for the horse's health in the long term. For example, it can be reinfected more aggressively, as it does not have protective antibodies against the disease.

However, in non-endemic areas the strategies must be to control and avoid the spread of the disease and the treatment must be aimed at the complete elimination of the parasite. Nonendemic nations that border endemic nations cannot completely prevent introduction of ticks (Fig.3) so diligent measures must be taken to reduce horses' contact with ticks. Several studies have investigated the use of vaccines to induce protective immunity yet none have been found to be completely effective in preventing infection.



Treatment

Several drugs have been tested with different efficacy against piroplasmosis. In general, it is reported that *T. equi* infection is much more difficult to clear than *B. caballi*, and that in some cases, *B. caballi* infection may self-clear over time. The two most used are Imizol Dipropionate (ID) and Buparvacuone.

- **Treatment with ID:** 2.2 to 4.4 mg/kg IM in a single dose or lower doses repeated if necessary every 24 to 72 hours for two or three treatments. To accomplish clearance of *B. caballi* from an animal residing in a nonendemic area, a dose of 4.0 mg/kg intramuscularly every 72 hours for four doses is effective. This drug has cholinergic activity so it is necessary to carefully monitor the appearance of side effects (agitation, sweating, colic, and diarrhea). To avoid these effects, treatment with Buscopan, atropine or glycopyrrolate can be combined. Local injection site swelling and muscle inflammation are common following ID administration. It is reported that donkeys and mules are more sensitive to ID toxicity, indicating its use in these species may be unpredictable and potentially fatal.
- **Treatment with buparvacuone:** buparvacuone can be effective in the treatment of acute *T. equi* infections, but sterilization of the infection with this drug could not be achieved. Parvaquone at 20 mg/kg body weight and buparvacuone at 4-6 mg/kg body weight i.v. or i.m. are therapeutically effective in acute *T. equi* infections.
- Acutely infected horses often require supportive care including, but not limited to, intravenous fluids, nonsteroidal anti-inflammatory drugs, pain management, and blood transfusions. Adequate hydration is essential on initiation of and during treatment with imidocarb.

Carriers represent challenges in diagnosis, eradication, and control measures. The parasites and their natural tick vectors are endemic to most countries with tropical and subtropical climates, and a small number of other nations, are considered “free” or nonendemic. Goals of infection and disease control vary tremendously between endemic and nonendemic nations.

Equine Ehrlichiosis

Ehrlichiosis is another tick-borne disease caused by obligate intracellular bacteria. The natural host of *E. equi* is the equine species, including donkeys. Horses of any age are susceptible, but the clinical manifestations are less severe in horses younger than 2 to 3 years of age. The disease manifestations are due to a vasculitis. The thrombocytopenia does not appear to be the result of platelets consumption associated with vasculitis. In experimental infection, the vasculitis manifestation in horses can be prevented by concurrent administration of corticosteroids, but the horses still develop a thrombocytopenia. No carrier state of the disease exists and it is not a notifiable disease according to the OIE list.

Symptoms

- **Fever**
- Depression
- Reluctance to move
- Icterus
- Anorexia
- Heart arrhythmias
- Colic-like symptoms
- Mild limb swelling
- Exacerbated concurrent infection (e.g., a leg wound or respiratory infection)

Hematologic changes include

- Leukopenia
- **Thrombocytopenia**
- Anemia
- Cardiac arrhythmias
- Inclusion bodies, principally in neutrophils and occasionally in eosinophils.

Diagnosis

Diagnosis is based on awareness of geographic area for infection, typical clinical signs and seasonality, abnormal laboratory findings, and finding characteristic Ehrlichia morulae in the cytoplasm of neutrophils or eosinophils. An indirect fluorescent antibody test is available, paired titer testing and PCR can be performed to confirm recent infection. However, because inclusion bodies are always visible during the mid-stages of the febrile period, complementary testing is not required to make a definitive diagnosis of horses in endemic areas or following recent visits to endemic areas.

Treatment

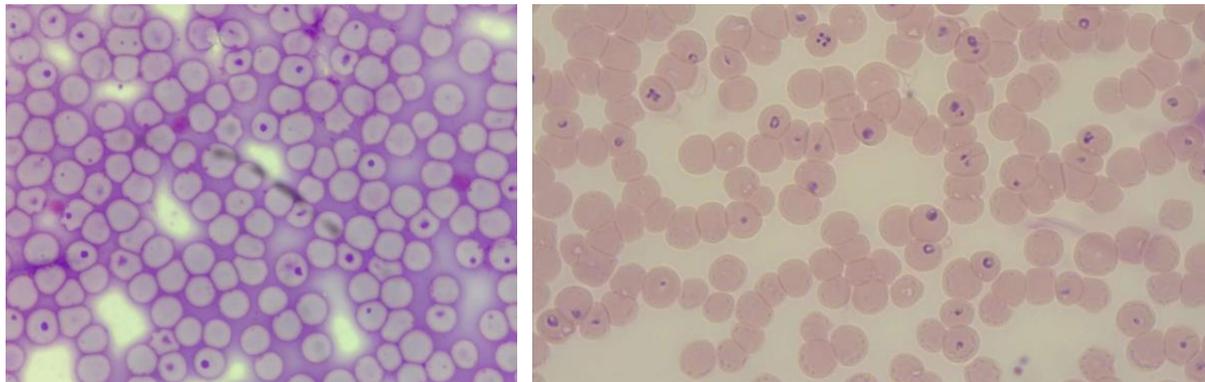
Intravenous administration of oxytetracycline at a rate of 7 mg/kg once daily has been a highly effective treatment. A prompt decrease in fever occurs in all cases within 12 to 24 hours of initiation of treatment. Treatment should continue for 7 days when infection is detected in the early stages. Doxycycline can also be used at 10 mg/kg twice daily PO.

No vaccine is available and it has been suggested arthropod vector control, particularly tick control. There is no need to isolate affected horses.



RECOMMENDED READINGS

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Figures 1 and 2. Smear samples of blood, horse 1 was suffering hemolytic anemia and Horse 2 acute piroplasmosis. Notice the differences in the appearance of the red blood cells.



Figures 3. Ticks in the tail of a mare that was later diagnosed with Piroplasmosis