FOCUS article: Equine Granulocytic Anaplasmosis: a tick-borne threat?

Catherine Butler DVM, MRCVS; the Animal Health Trust, UK

Introduction:

Equine anaplasmosis is likely to be unfamiliar to the majority of UK equine practitioners as it is a relatively new tick-borne disease which was first described in the United States (US) in 1969, but has since become increasingly recognised in both the US and Europe. Ticks are the most important vectors of diseases to domestic animals and human beings worldwide and *Ixodes ricinus* (sheep tick), the main vector tick in Europe, is known to transmit a variety of pathogens including *A. phagocytophilum*. The purpose of this focus article is to raise awareness of this disease and improve monitoring of the situation in horses by providing a brief overview.

Etiology:

The causative agent of equine granulocytic anaplasmosis (EGA) is *Anaplasma phagocytophilum*, a unique obligatory intracellular bacterium that survives and replicates in neutrophils and other granulocytes. *A. phagocytophilum* can elicit febrile disease in animals and human beings, and is transmitted in Europe predominantly *by I. ricinus* ticks (fig1). Ticks of the *I. ricinus* complex also act as vectors in the spread of *Borrelia burgdorferi* (the causative agent of Lyme disease) from one animal to another, and co-infections of *A. phagocytophilum* and *B. burgdorferi* have been confirmed in horses. The vector role for *Dermacentor reticulatus* (fig 1; vector for *Theileria equi* and *Babesia caballi*) in the transmission of *A. phagocytophilum* has been postulated but is still uncertain.

I. ricinus life cycle and seasonal activity:

The life cycle of *I. ricinus* includes four stages, the embryonated egg and three active instars, the larva, the nymph and the adult. Each of the active instars needs to take a blood meal before continuing development with larvae and nymphs usually feeding on smaller animals and adults feeding on large animals. However, the adult male *I. ricinus* does not need to feed. After a blood meal, the female finds a suitable sheltered microhabitat, lays several thousand eggs within one to four weeks, and dies. The entire life cycle of *I. ricinus*, depending on climatic conditions and the availability of hosts, lasts between two and six years. The developmental cycle of *I. ricinus* consists of spring and autumn feeding populations which are independent of each other. Tick activity starts when the average daytime temperature reaches 7°C or more, quickly reaches a peak in May or early June, and declines over the summer to reach a second smaller peak in autumn. In France, double as many ticks collected from pastures than ticks from woods carried *A. phagocytophilum* DNA and in the U.K., a significantly higher prevalence was found in upland than in woodland ticks.

Clinical signs of *A. phagocytophilum* infection in horses:

Following an incubation period of approximately 10 days, infected horses may experience subclinical disease or develop overt signs including pyrexia (>39.5° Celsius), depression, anorexia, reluctance to move, limb oedema and ataxia. Mild to severe morbidity and occasionally even mortality has been seen in EGA cases. The disease is often self-limiting, and clinical signs usually last seven to 14 days. Anaemia, leucopenia and thrombocytopenia are typically found in clinical cases of EGA.

Diagnosis:
Demonstration of granulocytic inclusions, either initial bodies or morulae (fig 2), in Wright-Giemsa- or haematoxylin and eosin-stained blood smears can confirm a clinical diagnosis, and is a sensitive diagnostic tool in the acute pyretic phase of the disease. PCR is another rapid and sensitive tool for detection, identification and phylogenetic analysis of *A. phagocytophilum* from blood, skin biopsy specimen and ticks.

Differential diagnosis:
Clinical signs in infected horses are not pathognomonic for the disease, and could be caused by infections with other pathogens such as *B. burgdorferi, Babesia caballi, Theileria equi*, equine herpes virus, equine infectious anaemia virus and equine arteritis virus.

Treatment and prevention:
Although most horses recover spontaneously after infection with *A. phagocytophilum*, treatment with oxytetracycline (7mg/kg/q24h/3-5 days) is indicated in horses showing severe- or persistent signs of infection. Even though licensed products with proven efficacy against ticks are currently unavailable for horses, careful inspection of horses after possible tick exposure and prompt removal of attached ticks will diminish the change of pathogen transmission. In areas with high tick burdens also nymphs that usually feed on smaller animals quest horses causing sometimes severe skin reactions (fig 3). Extraction of these nymphs prior to feeding is very difficult and often results in incomplete removal and a higher risk of pathogen transmission.

Conclusion:
It is likely that EGA in horses is under diagnosed in European countries, because the clinical signs are similar to those caused by infections with other pathogens and most horses recover without treatment. However, with tick-borne infections becoming more prevalent due to climatic change and changing epitopes, the identification and determination of questing ticks on horses and the recognition of tick-borne diseases in horses is imperative.

Fig 1: Left: fully engorged adult *Ixodes ricinus* ♀. Right: fully engorged *Dermacentor reticulatus* ♀.

Fig 2: Microscopic view of a stained blood smear with an *A. phagocytophilum* morula visible in a neutrophil

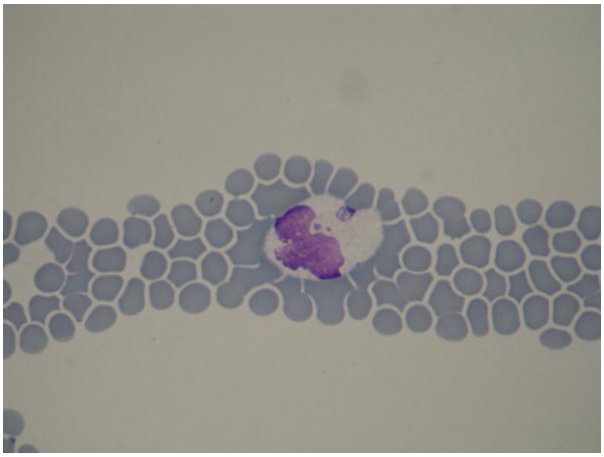

Fig 3: Clearly visible skin reactions located on the front legs in a horse covered with *Ixodes ricinus* nymphs after a ride in the forest. A fipronil containing fluid was administered locally and the nymphs fell of the next day.

Courtesy Dr Linda van de Wollenberg

Further reading

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