Equine Cutaneous Leishmaniasis

Definition

Leishmaniasis is caused by the obligate intracellular protozoa of the genus *Leishmania,* transmitted mostly by sandflies. There are more than 30 different species of *Leishmania* that vary by region, host, and associated disease syndrome.

Leishmania parasites are opportunistic pathogens that infect a large variety of mammals. Leishmaniasis is one of the leading parasitic causes of death in people, causing cutaneous, mucocutaneous or visceral syndromes. Dogs are the most commonly affected domestic species and can develop visceral and cutaneous lesions. While predominantly still a foreign animal disease, outbreaks of canine visceral leishmaniasis have been reported primarily in foxhounds in the United States.

Cutaneous leishmaniasis has been documented in equids around the world and is endemic in tropical and subtropical regions in both the Eastern and Western hemispheres (including South America, western and central Europe, and the Middle East). While equine leishmaniasis is documented in Puerto Rico, it is rarely seen in the continental United States. Cases in the United States have generally been seen in horses with international travel or recently imported from endemic areas. However, domestically acquired cases have occasionally been observed, with the first reported case in 2011 in a Morgan horse mare in Florida.

Clinical Signs

While other species such as humans and canines have documented visceral disease (with associated systemic clinical signs and fatal outcomes); to date, only cutaneous lesions have been documented in horses. Lesions are most commonly observed as nodules on the head, pinnae, scrotum, legs, and neck. They may be solitary or multiple, hair-covered or ulcerated, and range from 5 to 100 mm in diameter. Systemic clinical signs such as fever have not been documented in horses.

Incubation Period

Unknown

Risk Factors

No clear risk factor seems to correlate with equine *Leishmania* infections other than being in an endemic area with exposure to sandflies. Climate change may be contributing to larger endemic areas and the appearance of sporadic infections in non-endemic countries.

Transmission	In all mammalian species affected by leishmaniasis, infection via sandfly (*Phlebotomus* spp. in the Old World and *Lutzomyia* spp. in the New World) bites is considered the main mode of transmission. However, it has been recently demonstrated that a newly described *Leishmania* sub-genus termed *Munindia* which includes the species isolated from horses in Florida, *L. martiniquensis*, are probably transmitted by biting midges (*Culicoides* spp.). The female sandfly transmits the promastigote stages of the protozoa in the saliva during blood feeding. The promastigotes are endocytosed by host phagocytic cells where they differentiate into amastigotes, which multiply and are transported via the lymph and blood stream. The life cycle is completed when sandflies ingest the amastigote-infected phagocytes, and the parasites retransform into promastigotes in the sandflies' digestive tract. Vertical transmission occurs in dogs but has not been documented in horses despite multiple reported cases of cutaneous leishmaniasis in pregnant mares. Horizontal transmission via blood transfusion has been documented in canines and humans.
Diagnostic Sampling, Testing and Handling	Microscopic observation of amastigotes within macrophages in Giemsa-stained impression smears or biopsies of the border surrounding the cutaneous lesion can result in preliminary diagnosis. The amastigote form has a classic appearance with a rod-shaped kinetoplast oriented perpendicularly to the oval nucleus. Immunohistochemistry has also been used to successfully identify *Leishmania* organisms. PCR can be used to confirm infection and identify the organism to the species level by targeting the ribosomal transcriber spacer 1 (ITS1) region. Serologic testing is used widely in human and canine medicine for surveillance of visceral infections but is less reliable for cutaneous disease. IFAT is the most frequently used serologic technique, but it has a low specificity due to cross reactivity with antibodies against other pathogens such as *Trypanosoma cruzi* and *Toxoplasma gondii*. Direct agglutination test (DAT) and ELISA have also been used with variable but generally low specificity. Diagnostic testing is not widely available in the United States but may be performed through the CDC or certain university laboratories. *Equine Leishmaniasis is a World Organization for Animal Health (OIE) reportable disease and suspect or confirmed cases should be reported to state and federal animal health officials.*
Post-mortem	Cutaneous leishmaniasis in horses has not been documented to be fatal.
Shedding of Organism Following Resolution of Clinical Signs	Unknown

Environmental Persistence	Unknown
Treatment	Medical treatment of human or canine leishmaniasis may include pentavalent antimonial compounds (administered systemically or locally), allopurinol (primary drug used for dogs), miltefosine, amphotericin B, ketoconazole, paromomycin and itraconazole. However, given the paucity of equine cases, the effect of any of these drugs on equine leishmaniasis is yet to be determined. Most clinical equine cases spontaneously resolve within 3-6 months. Reported successful therapies for persistent or recurrent cases include: - Complete surgical excision of the lesions. - Intralesional injections of pentavalent antimonial drugs (sodium stibogluconate, 3-4 injections of 150 mg every 2-3 days). - Systemic IV transfusions of pentavalent antimonial drugs (sodium stibogluconate, 1 mg/kg once daily for 10 days). - A combination of local and systemic antifungals (systemic fluconazole, loading dose of 12 mg/kg PO once followed by 5 mg/kg PO once daily for 60 days, combined with three intralesional injections of amphotericin B, 50 mg, every 2-3 days).
Prognosis	The prognosis of *Leishmania* infection in horses is generally good. To date, only cutaneous leishmaniasis have been reported in horses, which resolves with or without treatment.
Prevention	The primary control method is reducing sandfly vector populations and limiting their contact with animals. These measures may include eliminating sandfly habitats, the use of netting, and environmental or topical application of insecticides.
Vaccination	Currently, vaccination against leishmaniasis is only available for dogs in Europe and South America. However, the use of topical insecticides (collars or spot-on) effective against sandflies is considered to be more effective than vaccination in preventing infection in dogs. The use of these products to prevent infection in horses have not been evaluated.
Biosecurity	Leishmaniasis is not directly contagious, and the ability of infected horses to act as reservoirs for sandfly infection is still undetermined. Therefore, isolation and implementation of biosecurity measures are not strictly required for infected horses. Nevertheless, the diagnosis of infected animals may suggest the presence of infected vectors in the area, and thus, should call for implementation of preventive measures and vector control.

Zoonotic Potential	There is no documented zoonotic risk of transmission from horses to humans. Horses may serve as sentinels for potential infection from sandflies to humans in endemic regions, and some prevalence studies have suggested that equids and dogs may serve as reservoirs of *L. braziliensis* and/or *L. infantum*.
Further reading	- Reuss, S.M., 2013. Review of equine cutaneous leishmaniasis: not just a foreign animal disease. In Am Assoc Equine Pract (Vol. 59, pp. 256-60). - Mhadhbi, M. and Sassi, A., 2020. Infection of the equine population by Leishmania parasites. Equine veterinary journal, 52(1), pp.28-33. - Maroli, M., Gradoni, L., Oliva, G., Castagnaro, M., Crotti, A., Lubas, G., Paltrinieri, S., Roura, X., Zini, E. and Zatelli, A., 2010. Guidelines for prevention of leishmaniasis in dogs. *Journal of the American Veterinary Medical Association*, *236*(11), pp.1200-1206. - Espinosa, O. A., Serrano, M. G., Camargo, E. P., Teixeira, M., & Shaw, J. J. 2018. An appraisal of the taxonomy and nomenclature of trypanosomatids presently classified as *Leishmania* and *Endotrypanum*. *Parasitology*, *145*(4), 430–442. - Becvar, T., Vojtkova, B., Siriyasatien, P., Votypka, J., Modry, D., Jahn, P., Bates, P., Carpenter, S., Volf, P., & Sadlova, J. 2021. Experimental transmission of *Leishmania* (*Mundinia*) parasites by biting midges (Diptera: Ceratopogonidae). *PLoS pathogens*, *17*(6), e1009654.

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