CASE REPORT

Leptospira Induced Haemoglobinuric Nephrosis in an Adult Horse and it's Therapeutic Management: An Uncommon Incidence

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Leptospirosis is a zoonosis caused by the spirochete, *Leptospira interrogans*, affecting various livestock species, including horses. Animals can act as carriers or reservoirs, transmitting the bacteria through urine to humans and thus has a great impact on public health. Worldwide, every year, approximately 1.03 million clinical cases are being reported in humans, leading to 58,900 deaths (Romanowski *et al.,* 2023). Clinical form of leptospirosis in horses is uncommon or rare (Malalana, 2019) and infrequently reported owing to subclinical form of the disease and diagnostic challenges (Verma *et al.,* 2013). The most common manifestation in affected horse is equine recurrent uveitis (ERU) (Gerding and Gilger, 2016), though the disease can cause vasculitis affecting kidneys, liver, central nervous system and genital tract (Divers *et al.,* 2019). Horses acquire leptospirosis through feed or water contaminated with infectious urine and reproductive fluids (Verma *et al*., 2013) or through the skin. This paper reports an unusual case of equine leptospirosis with haemoglobinuria, it's diagnosis by microscopic agglutination test and successful therapeutic management.

Case History and Observations

A seven-year-old male crossbred horse was brought to the Teaching Veterinary Clinics, Veterinary College and Research Institute, Tirunelveli (Tamil Nadu, India) with the history of hyporexia and red urine for 2 to 3 days. Clinical examination revealed congested and slightly icteric conjunctival mucosa, body temperature of 39.1°C, tachycardia (54 beats/min), enlargement of prescapular lymphnode and haemoglobinuria (Fig. 1, 2). Peripheral blood smears collected and subjected to Giemsa staining, revealed negative for the equine piroplasm, *Theileria equi*. Blood in EDTA subjected to polymerase chain reaction (PCR), revealed negative for the piroplasmic infection. Whole blood and serum samples were collected for haemato-biochemical analysis using auto-analyser. Elevated packed cell volume, bilirubin, blood urea nitrogen (BUN), calcium and phosphorus levels, with a reduction in platelet, sodium and potassium levels could be observed (Table 1). Serum sample was subjected to microscopic agglutination test (MAT) as per standard protocol, for diagnosis of leptospirosis at Zoonosis Research Laboratory, Tamil Nadu Veterinary and Animal Sciences University, Chennai. The test was performed using a panel of ten pathogenic serovars of *Leptospira interrogans* such as Australis, Autumnalis, Ballum, Canicola, Grippotyphosa, Hardjo, Icterohaemorrhagiae, Tarassovi, Pomona and Pyrogenes. The horse showed a positive titre of 200 for three serovars namely, Australis, Pyrogenes and Hardjo, and a positive titre of 100 for three serovars namely, Autumnalis, Tarassovi and Pomona. Seroconversion was not detected for the remaining serovars. Based on the clinical signs and positive titre by MAT, the case was diagnosed as sub-acute of leptospirosis.

Treatment and Discussion

The case was treated with amoxicillin and cloxacillin @ 10 mg/kg b.wt. BID, to manage leptospiraemia, flunixin meglumin @ 1.1 mg/kg b.wt., SID, to manage pyrexia and toxaemic effects and chlorpheniramine maleate @ 0.5 mg/kg b.wt., SID for antihistaminic effect, intravenous dextrose normal saline @ 10 mL/kg b.wt. SID and Ringer's lactate @10 mL/kg b.wt. SID for fluid replacement. The case completely recovered after 5 days post-treatment.

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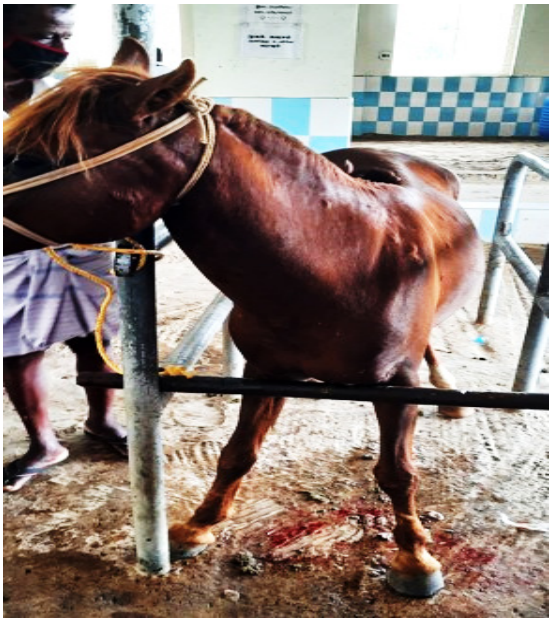

Fig. 1: Haemoglobinuric nephrosis evidenced by red urine voided by the horse affected with leptospirosis

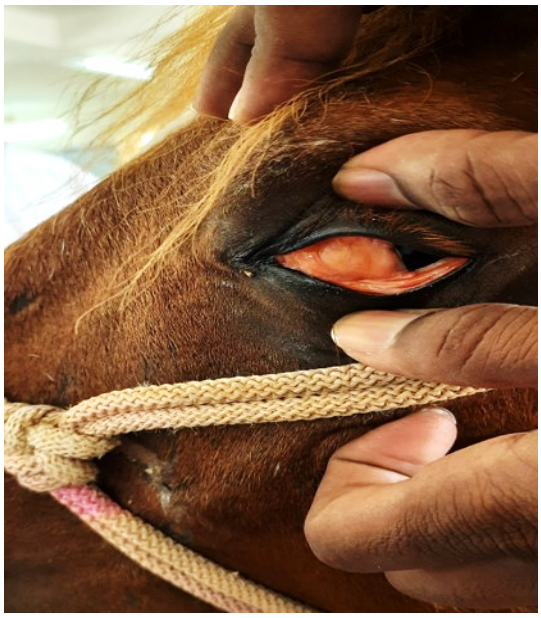

Fig. 2: Congestion and mild icterus of conjunctival mucosa in the horse affected with leptospirosis

Table 1: Haemato-biochemical values of the horse affected with leptospirosis

Parameters	Positive case	Reference value
Hb (g/dL)	18.3	10.1-16.1
PCV (%)	60.3	32-32
RBC ($\times 10^6$/µL)	11.71	6-10.4
WBC ($\times 10^3$/µL)	12.3	5.6-12.1
Platelet ($\times 10^3$/µL)	116	117-256
Neutrophils (%)	53	52-70
Lymphocytes (%)	40	21-42
Eosinophils (%)	7	0-7
Total protein (g/dL)	6.3	5.2–7.9
Albumin (g/dL)	3.6	2.6–3.7
Globulin (g/dL)	2.7	2.6-4.2
Bilirubin (mg/dL)	3.9	0-3.2
AST (U/L)	239	226-366
ALP (U/L)	172	143-395
BUN (mg/dL)	55.26	10-24
Creatinine (mg/dL)	1.1	1.2–1.9
Calcium (mg/dL)	16.1	11.2–13.6
Phosphorus (mg/dL)	6.1	1.8–5.6
Sodium (Meq/L)	121	128-142
Potassium (Meq/L)	2.5	2.9-4.6
Chloride (Meq/L)	108	99-109

Leptospirosis was confirmed by MAT, as MAT is the gold standard test and inclusion of relevant serovars as test antigens requires a knowledge on the epidemiology of leptospirosis in the study region (Verma *et al.,* 2013). In this report, serovars Australis, Pyrogenes and Hardjo had high tires, whereas Ramsay *et al.* (2024) reported the serovars Australis, Autumnalis, and Bratislava with titres more than 800 in equine leptospirosis. Farias *et al.* (2020) also recorded a high positivity for the serovar, Australis in horses. Previously, serological studies revealed the susceptibility of horses to infections caused by various serovars (Díaz *et al.,* 2023), mainly, Pomona and Grippotyphosa and also Icterohaemorrhagiae, Autumnalis, Sejroe, Canicola, and Ballum (Paul *et al*., 2019). Nevertheless, in a review of 21 reports on equine leptospirosis, Bratislava was the serovar most commonly reported (Oscar *et al*., 2021). Distribution of different serovars revealed by serological studies in horses may be associated with the geographical region as well as the presence of the specific hosts to these host adopted serovars (Sohail *et al*., 2017).

The clinical signs observed in this adult horse were in accordance with that of Paul *et al*. (2019), however, classic icteric leptospirosis is generally reported in foals and relatively rare in adult horses (Verma *et al*., 2013; Sohail *et al*., 2017). In this case, red urine could be associated with haemoglobinuric nephrosis, and icterus could be associated with elevated serum bilirubin due to intravascular haemolysis, and this indicated prehepatic jaundice caused by leptospira. Tachycardia could be due to the toxaemic effect caused by leptospira and

dehydration. Elevated blood urea nitrogen and phosphorus level could be associated with renal involvement (Adler and Moctezuma, 2010), though creatinine level was within range. Haemoglobinuria and hyponatremia indicated chronic kidney disease induced by leptospira (Ramsay *et al.,* 2024). Hypokalemia could be associated with inhibition of reabsorption for potassium by glycolipoproteins present in *Leptospira*. The proximal tubular injury decreases sodium and water reabsorption and increases sodium and water transport to the distal nephron, which may increase potassium excretion causing hypokalemia (Sitprija, 2008). Thrombocytopenia could be associated with haemorrhage due to vascular damage (Sohail *et al*. 2017). Sohail *et al*. (2017) and Paul *et al*. (2019) reported anaemia, leukocytosis with neutrophilia in equine leptospirosis and Ramsay *et al*. (2024) reported epistaxis, pulmonary haemorrhage and liver disease in addition to acute kidney injury in equine leptospirosis.

In conclusion, horses are found to rarely become clinical cases of leptospirosis, though increased seroprevalence has been recorded by previous epidemiological studies. Infected horses, either as subclinical carriers or maintenance hosts, could be the potential sources of infection to humans, posing threat to human health. Hence, periodical sero-epidemiological survey in horses is necessary to identify the inapparant cases of leptospirosis.

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References

Adler, B., & Moctezuma, A.D.P. (2010). *Leptospira* and leptospirosis. *Veterinary Microbiology, 140*, 287-296.

Díaz, E.A., Arroyo, G., Saenz, C., Mena, L., & Barragan, V. (2023). Leptospirosis in horses: Sentinels for a neglected zoonosis? A systematic review. *Veterinary World*, *16*(10), 2110-2119.

Divers, T.J., Chang, Y.F., Irby, N.L., Smith, J.L., & Carter, C.N. (2019). Leptospirosis: An important infectious disease in North American horses. *Equine Veterinary Journal*, *51*, 287-292.

Farias, D.K., Dick,G., Bunn, S., Neto, A.T., Rech, C., Menin, A., & Saito, M.E.(2020). Risk factors related to seropositivity for *Leptospira* spp. in horses in the Serra Catarinense region. *Ciencia Rural*, *Santa Maria*, *50*(7), e20190483.

Gerding, J.C., & Gilger, B.C. (2016). Prognosis and impact of equine recurrent uveitis. *Equine Veterinary Journal*, *48*, 290-298.

Malalana, F. (2019). Leptospirosis in horses: A European perspective. *Equine Veterinary Journal, 51*(3), 285-286.

Oscar, T.S., Juan, P.R., Antonio, H.B., Jorge, T.B., & German, L.G. (2021). Frequency of Leptospira spp. serovars reported in horses: A literature review. *Abanico Veterinario*, *11*, 1-16.

Paul, B.R., Sharma, D.K., Raguvaran, R., Singh, S., Gandhar, J.S., & De, U.K. (2019). Therapeutic management of classic icteric leptospirosis in an adult horse - A case report. *Indian Journal of Veterinary Medicine, 39*(2), 45-47.

Ramsay, L., Eberhardt, C., & Angelika Schoster. (2024). Acute leptospirosis in horses: A retrospective study of 11 cases (2015-2023). *Journal of Veterinary Internal Medicine*, *38*, 2729-2738.

Romanowski, T., Dias, R., Marcos Bryan Heinemann, Stephani Felix Carvalho, Silva, T.A., Martins, A.S., Geovanna Domingues da Cunha Caetano, Alvaro Ferreira Junior, Santos, J.A., & Borsanelli, A.C. (2023). Seroprevalence of equine leptospirosis in the State of Goias, Brazil. *Veterinary Sciences*, *10*, 590.

Sitprija, V. (2008). Altered fluid, electrolyte and mineral status in tropical disease, with an emphasis on malaria and leptospira. *Nature Reviews Nephrology*, *4*, 91-101.

Sohail, M.L., Khan, M.S., Ijaz, M., Avais,M., Zahoor, M.Y., Naseer, O., & Saleem, M.U. (2017). Evidence of clinico-pathological changes during equine leptospirosis *Pakistan Journal of Zoology, 49*(3), 849-853.

Verma, A., Stevenson, B., & Adler, B. (2013). Leptospirosis in horses. *Veterinary Microbiology, 167*, 61-66.