

Association of *Trypanosoma theileri* with peritonitis in a pregnant cross-bred cow: a case report

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ABSTRACT: This clinical case report deals with a very rare case of the detection of *Trypanosoma theileri* in the peritoneal fluid of a seven-year-old eight month pregnant cross-bred cow in fourth parity showing frank peritonitis. Peritoneal tab cytology revealed chronic active peritonitis and the presence of polymorphic *T. theileri* organisms. The parasite was also occasionally detected in blood smears. The protozoan, considered by and large non-pathogenic, has previously been detected in aberrant body sites, other than the peritoneal cavity. A perusal of the available literature indicates that this is the first report of this large stercoarrian trypanosome associated with peritonitis, which was characterized by infiltration of mononuclear cells and neutrophils, as well as a significant number of intact and degranulating eosinophils, not usually seen in protozoan infections.

Keywords: cross-bred cow; cytology; peritonitis; *Trypanosoma theileri*

There are only two species of trypanosomes viz. *Trypanosoma evansi* and *Trypanosoma theileri*, which infect domestic animals in India. Among these two haemoflagellates, the salivarian trypanosome, *T. evansi*, is one of the most important haemoprotozoans. It causes a widely prevalent serious disease of domestic and wild animals which is of considerable economic importance in the Indian subcontinent (Singla et al., 2004; Gupta et al., 2009). However, *T. theileri*, a large stercoarrian trypanosome (Herbert, 1964) occurs extremely rarely and has only been reported occasionally to be present in the peripheral blood of cattle and buffaloes in India (Kalra et al., 1984) and abroad (Villa et al., 2008). Although the parasite has been considered harmless, yet it has been found to be pathogenic in concurrence with diseases such as anaplasmosis, theileriosis as well as rinderpest post immunisation (Levine et al., 1956; Hoare, 1972; Wells, 1972). Detectable peripheral blood parasitaemia, induced probably by immunomodulatory mechanisms, has usually been noticed when other concurrent diseases are present in the same host (Hoare, 1972). Moreover, the life-cycle of *T. theileri* within the mammalian host and its host-parasite relationship is not fully understood

(Wells, 1976). A perusal of literature reveals that to date *T. theileri* has not been detected in the peritoneal fluid or in association with fulminating acute or chronic peritonitis in cattle. Thus, this appears to be the first report of *T. theileri* and its association with peritonitis in cattle.

Case description

A seven-year-old cross-bred cow, eight months pregnant and in fourth parity, was presented to the Veterinary Teaching Hospital of Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana in the month of June, 2008 with a history of pyrexia (104 °F) and abdominal pain for the last two days, followed by persistent anorexia. The animal had been transported by a truck for about 80 km by road. Clinical examination revealed poor reticulo-ruminal function as detected by the absence of amplitude and frequency of ruminal motility and doughy ruminal consistency, but no perceptible anaemia, jaundice or diarrhoea. The animal was reasonably alert and per-rectum examination revealed the foetus to be in good condition.

Pathological and parasitological examination

As the animal had a history of abdominal pain and the clinician suspected peritonitis, a peritoneal tap was performed and 10 ml of pale-yellow cloudy peritoneal fluid was collected. Wright-Giemsa-stained thin smears prepared from the sediment of the peritoneal fluid (after centrifugation at 2000 × G) were examined under a bright field microscope.

DISCUSSION AND CONCLUSIONS

Haematological examination showed normal total leucocyte count (6500/μl) with relative lymphocytosis and neutropenia (DLC; lymphocyte = 81%, neutrophils = 18%, monocytes = 01%).

Peritoneal fluid cytology revealed an admixture of mononuclear cells including lymphocytes, macrophages/activated mesothelial cells along with degenerated/toxic neutrophils and intact/degranulating eosinophils. In some smears bunches of proliferating mesothelial cells (Figure 1) were also seen indicating protracted/chronic active inflammation. A number of *T. theileri* organisms characterized by a free flagellum, a large non terminal kinetoplast typically located near the nucleus and far from the pointed posterior end were also seen in most smears (Figure 2). Trypanosomes in the present case were pleomorphic and varied from 30–60 μ in size (Figure 3). Based on the peritoneal fluid findings it was concluded that the peritonitis was of a chronic active nature. Eosinophils are rarely seen in the peritoneal fluid; their presence in this case (Figures 3 and 4) might indicate irritational or allergic responses probably exerted by the parasites.

Based on the peritoneal fluid cytology, the blood smears previously declared negative for trypanosomes on re-examination showed the occasional presence of *T. theileri*, particularly in thick areas (Figure 5). The parasite was confirmed to be *T. theileri* on the basis of morphological and microscopic description (Levine, 1973; Gill, 1991).

T. theileri is uncommon in occurrence and has mostly been reported from aberrant body sites other than the peritoneal cavity. It has previously been observed in the sero-sanguineous fluid from the submandibular oedema from a bullock exhibiting clinical signs similar to black quarter disease in the Karnataka state of India (Muraleedharan et

al., 1985). The parasite has also been detected in other tissues and fluids, e.g., the lymph node aspirate of a cow calf (Doherty et al., 1993), bovine spleen (Oyamada et al., 1995), cerebrospinal fluid of a heifer (Braun et al., 2002) and from the heart, lung, kidney and thoracic and cerebrospinal fluid of a prematurely born calf (Mitchell and Long, 1980).

Though detectable peripheral blood parasitaemia in cases of *T. evansi* infection is a common finding (Gill, 1991), yet in contrast *T. theileri* has been mostly detected in body fluids and tissues other than blood (Mitchell and Long, 1980; Muraleedharan et al., 1985; Doherty et al., 1993; Oyamada et al., 1995). However, there seems to be no report of *T. theileri* from the peritoneal fluid of a cow showing frank peritonitis. The parasite is considered by and large non-pathogenic, but its concurrence with peritonitis in the present case and with another case of submandibular oedema from a bullock exhibiting the clinical signs similar to black quarter disease reported previously (Muraleedharan et al., 1985), do not rule out a role in the causation of tissue inflammation. The presence of abundant mononuclear cells, particularly lymphocytes in the peritoneal fluid and peripheral blood may hint at a protracted inflammatory/immune response, potentially incited by or against the parasite. Another significant finding of the present case was the presence of several intact as well as degranulating eosinophils in the peritoneal fluid which is rather uncommon for trypanosome infections but commonly observed in nematode infections.

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REFERENCES

- Braun U, Rogg E, Walser M, Nehrbass D, Guscetti F, Mathis A, Deplazes P (2002): *Trypanosoma theileri* in the cerebrospinal fluid and brain of a heifer with suppurative meningoencephalitis. *Veterinary Record* 150, 18–19.
- Doherty ML, Windle H, Voorheis H, Larkin H, Casey M, Clery D, Murray M (1993): Clinical disease associ-

- ated with *Trypanosoma theileri* infection in a calf in Ireland. *Veterinary Record* 132, 653–656.
- Gill BS (1991): Section 3 *Trypanosoma theileri* (*Megatrypanum*) *theileri* Laveran, 1902. In: Trypanosomes and Trypanosomiasis of Indian livestock. 1st revised edition. Indian Council of Agricultural Research, New Delhi. 172–191.
- Gupta MP, Kumar H, Singla LD (2009): Trypanosomosis concurrent to tuberculosis in black bucks. *Indian Veterinary Journal* 86, 727–728.
- Herbert I V (1964): *Trypanosoma theileri*, Laveran, 1902. A cosmopolitan parasite of cattle. *Veterinary Bulletin* 34, 563–570.
- Hoare CA (1972): VII. Subgenus *Megatrypanum*. In: Hoare CA (ed.): *The Trypanosomes of Mammals*. A Zoological Monograph. 1st ed. Blackwell Scientific, Oxford. 123–208.
- Kalra IS, Singh KB, Singh BP, Singh RP, Nauryial DC, Galhotra AP (1984): *Trypanosoma theileri* infection in cows. *Indian Veterinary Journal* 61, 612–614.
- Levine ND (1973): The hemoflagellates. In: Levine ND (ed.): *Protozoan Parasites of Domestic Animals and of Man*. 2nd ed. Burgess Publishing, Minneapolis. 36–78.
- Levine ND, Watrach AM, Kantor S, Hardenbrook HJ (1956): A case of bovine trypanosomiasis due to *Trypanosoma theileri* in Illinois. *Journal of Parasitology* 42, 533.
- Mitchell FE, Long IR (1980): Bovine foetal death due to *Trypanosoma theileri* infection. *Proceedings of 3rd Annual Meeting of the American Association of Veterinary Laboratory Diagnosticians* 23, 67–72.
- Muraleedharan K, Bhaskar UK, Krishnamurti K (1985): *Trypanosoma theileri* infection in a bullock – A case report. *Current Research* 14, 61–62.
- Oyamada T, Xie B, Yoshikawa H, Yoshikawa T (1995): Isolation and morphological study of *Trypanosoma (Megatrypanum) theileri* from bovine peripheral blood and spleen in Japan. *Japanese Journal of Parasitology* 44, 143–148.
- Singla LD, Aulakh GS, Juyal PD, Singh J (2004): Bovine Trypanosomosis in Punjab, India. *Proceedings of 11th International Conference of the Association of Institutions for Tropical Veterinary Medicine*, 283–285.
- Villa A, Gutierrez C, Gracia E, Moreno B, Chacon G, Sanz PV, Buscher P, Touratier L (2008): Presence of *Trypanosoma theileri* in Spanish cattle. *Annals of the New York Academy of Sciences* 1149, 352–354.
- Wells EA (1972): Infections of cattle with trypanosomes of the sub-genus *Megatrypanum* (Hoare 1964). *Commonwealth Agricultural Bureau*, 63 pp.
- Wells EA (1976): Subgenus *Megatrypanum*. In: Lumsden WHR, Evans DA (eds.): *Biology of the Kinetoplastida*. Vol. 1. Academic Press, New York, London. 257–284.

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Supporting material

Figures available online at <http://vetmed.vri.cz>

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