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Unusual clinical signs presentation of tropical theileriosis (*Theileria annulate*) infection associated with orbital lesions in Calves in Al Muthhana Province

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Abstract

This study is reported uncommon clinical signs presentation of *Theileria annulata* infection in ten calves in Al Muthanna veterinary teaching hospital. These calves were admitted to the clinic during the period extended from October 2020 to May 2021. The age of these calves were ranged between 1 to 5 months. All Calves were revealed severe enlargement of bilateral superficial lymph nodes especially the prescapular accompanied with disseminated multiple subcutaneous and intramuscular nodules. A severe bilateral orbital cellulitis and exophthalmia were observed in all cases. The calves were also showed fever, paleness, icteric mucus membrane, and obvious petechial hemorrhage on the oral cavity, tongue, and conjunctiva associated with lacrimation, severe respiratory syndrome and depression. Blood and Lymph smears were confirmed the presence of piroplasmic organisms and Koch's blue bodies, respectively. All cases were treated with a single dose of Buparvaquone (2.5mg/Kg BW), accompanied with long-acting oxytetracycline and other supportive therapy such as multivitamin and fluid therapy. According to the results of this epidemiological study the authors recommend to do another epidemiological study to investigate the features of tropical theileriosis in Al Muthanna province included all regions.

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Introduction

Every year, livestock are suffering from tick-borne diseases accompanied by huge global economic losses, especially in tropical and sub temperate areas (McCosker , 1979; de Castro, 1997).

Tropical theileriosis is caused by *Theileria annulata.* It is a tick-borne disease that causing morbidity and loss of productivity in indigenous cattle but occurs in a very severe lethal form in imported and crossbreed cattle. Theileriosis is considered a major constraint to livestock production and breeding improvement, when the naive exotic cattle like Holstein and Friesian are imported to improve the productivity of local breeds, as these breeds are highly susceptible to this infection. The disease has a wide geographical distribution extended from the Mediterranean region of Europe and African, the Near Middle East, China, and Asia. (Dolan, 1989; Brown, 1997).

In Iraq, tropical theileriosis is the most prevalent important bovine fatal disease that causes severe economic loss in a wide range of both domestic and wild animals including bovine, buffaloes, sheep and goats. The disease reported from all provinces of Iraq from Basra in the south to north in kurdistan region and from east to the west of Iraq (Omer *et al.,* 2007; Muslih *et al.,* 1988; Latif *et al.,* 1977; Alsaad *et al .,* 2013; Al-Obaidi & Alsaad, 2004; Al-Saeed, *et al.,* 2010).

Theileria species are transmitted by ixodid ticks of the genera *Amblyomma, Haemaphysalis, Hylomma*, and *Rhipicephalus*. Several *Theileria spp.* can infect cattle, however, the two most pathogenic and economically important are *T. parva* and *T. annulata* (OIE, 2018; Kohli *et al.,* 2014; Gul *et al.,* 2015; Gebrekidan *et al.,* 2016).

The most common clinical signs of tropical theileriosis is fever, loss of appetite, weight, weakness, and oral & conjunctival petechia accompanied with enlargement lymph nodes, icterus, anemia. Some animals showed diarrhea and dysentery especially in the late stage of the disease (Radostits *et al.,* 2010). The bovine calf may also showed an extremely fatal condition called the turning sickness, which showed blockage of capillaries of the central nervous system due to cells infection and leads to neurologic symptoms (Gul *et al.,* 2015).

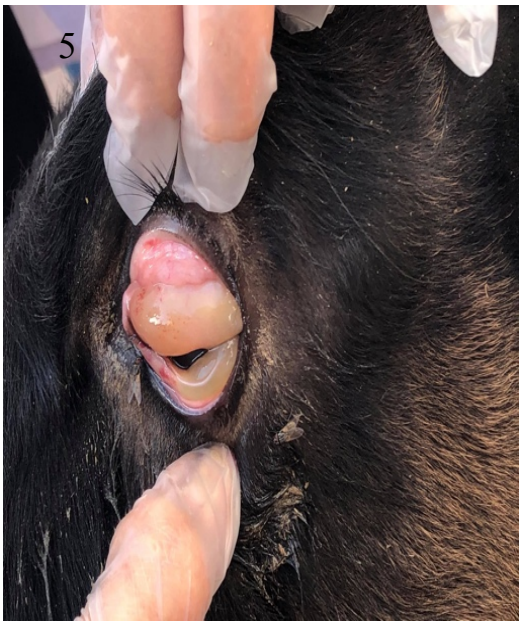
A review of literature revealed scarce publications regarding tropical theileriosis in Al Muthanna province/ Iraq. Therefore, the present study reported 10 cases of bovine theileriosis in young crossbreed calf aged between 1 to 5 months and documented the uncommon clinical signs and its treatment procedure.

History and clinical Observations

Ten calves were presented to Al Muthanna veterinary teaching hospital, extended from October 2020 to May 2021. The age of calves were ranged between 1 to 5 months. All Calves were presented with a case history of anorexia and loss of appetite. The animals suffered from severe enlargement of bilateral superficial, especially the prescapular lymph nodes (Figure.1).

Figure.1: Shows enlargement of the prescapular lymph nodes

Additionally, disseminated multiple subcutaneous and intramuscular nodules were also seen. A severe bilateral orbital cellulitis and exophthalmia were very obvious in all cases with variation in severity (Figure. 2,3,4,5).



Figures. 2,3,4,5: shows obvious orbital cellulitis and icterus mucus membrane

Upon clinical examination, heavy tick infestation was obvious on all animals. The calves were showed high fever (39.9-40.5 º C), paleness, icteric mucus membrane, and obvious petechial hemorrhage on the oral cavity, tongue, and conjunctiva associated with lacrimation, severe respiratory syndrome and depression (Figure. 6, 7, 8, 9,10).

Figure. 6: Shows obvious petechial hemorrhage on the oral cavity

Figure. 7: Shows obvious petechial hemorrhage on the lower lip

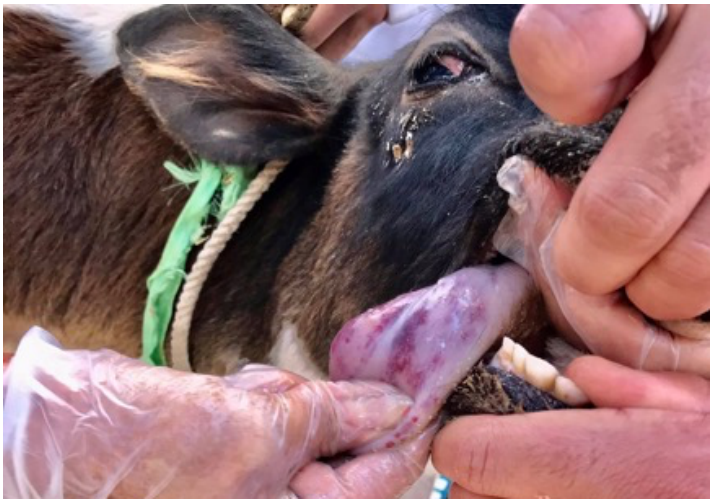


Figure. 8: Shows obvious distributed petechial hemorrhage on the tongue

Figure. 9: shows obvious depression and nasal discharges and eye lesion

Figure. 10: Shows nasal discharge and icterus nasal mucus membrane and surrounded skin

The suspected diagnosis was heamoprotozoan diseases. The confirmation of the diagnosis were done by blood smears collected from the ear vein for the presence of any piroplasms in red blood cells. While the prescapular lymph node aspiration was also done for the presence of Koch's blue bodies, indicative of piroplasm infection. Both blood and Lymph smears were stained with Giemsa. They examined under light microscopy100X magnification for the presence of any intra-erythrocytic piroplasms

and Koch's blue bodies. Microscopical examination of the Giemsa stained thin smear revealed characteristic intra erythrocytic piroplasms identified as T. annulate, while lymph smear was approved presence of Koch's blue bodies infected lymphocytes (Figure. 11& 12).

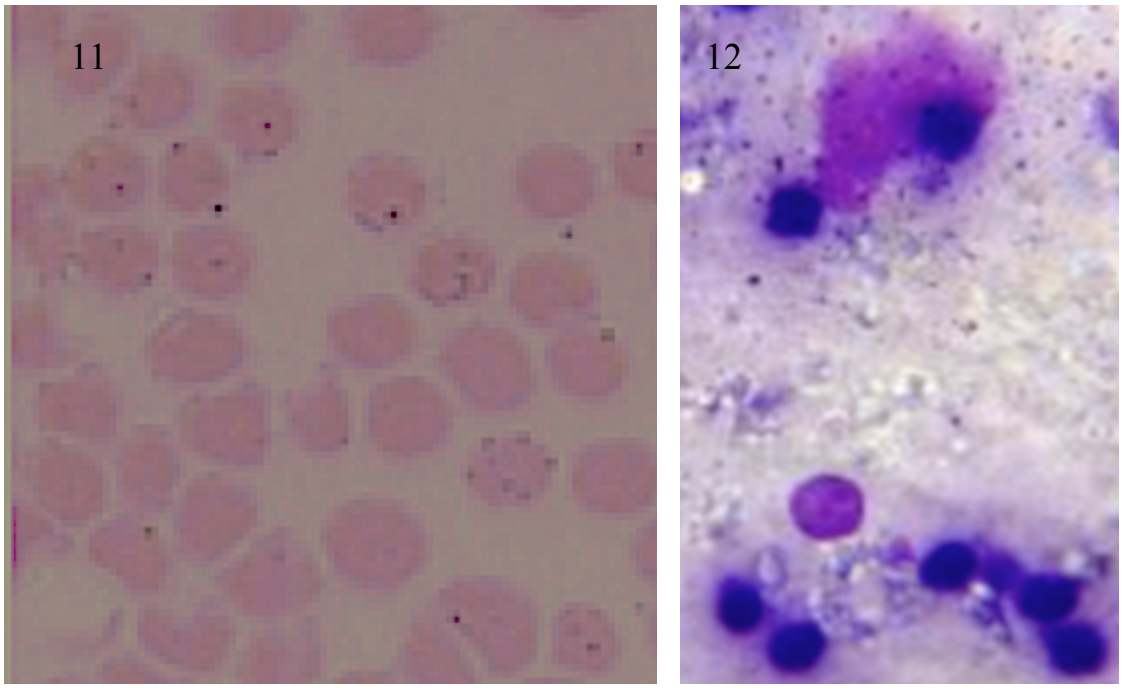


Figure. 11: Shows revealed the characteristic intra erythrocytic piroplasms identified as T. annulate (100X).
Figure. 12: Shows revealed infected lymphocytes filled with Koch's blue bodies (100X)

All cases were treated with a single dose of Buparvaquone (2.5mg/Kg BW), accompanied with long-acting oxytetracycline and other supportive therapy such as multivitamin (AD3 A and vitamin E & selenium) and fluid therapy.

Discussion

Al Muthanna is considered as one of the important Iraqi provinces in livestock production and has important impact on economy of the farmers. Moreover, the province has abundant diversity of livestock, including cattle, buffaloes, sheep, goats and camels like other Iraqi provinces (Al Salihi, 2012).

Theileriosis is a tick-borne disease related to livestock production in majorities of developing countries, including Iraq. It is reported in all Iraqi provinces and led to high morbidity, mortality, reduction in milk and meat production, and the cost of treating the infected animals (Tallaf, 2017; Alsaad *et al.,* 2013; Al-Saeed *et al.,* 2010; Alkhaledi, 2008; Omer *et al.,* 2007; Al-Obaidi & Alsaad, 2004; Latif *et al.,* 1977; Muslih *et al.,* 1988). *Theileria spp* is intracellular parasite cause active latent bovine theileriosis. The initial diagnosis of the disease is based on clinical signs and microscopical examination of lymph and blood smears. The current study is presented ten calves infected by

Theileria annulata in Al Muthanna veterinary teaching hospital. The case history of these cases according to the owner's depression, loss of appetite, and severe bilateral orbital cellulitis and exophthalmia that are recognized by the owners as serious signs. Upon clinical examination of the calves, there was the severe enlargement of bilateral superficial, especially the pre-scapular and pre femoral lymph nodes, and the existence of disseminated multiple subcutaneous and intramuscular nodules. Moreover, fever, respiratory signs, pale-yellowish mucous membrane, eye congestion, and lacrimation. All these clinical signs are in agreement with other previous studies that reported in Iraq or other countries worldwide, particularly for the orbital lesions (Al-Robayi, 1999; Muhammad *et al.,* 1999; Hussein *et al.,* 2004; Gupta *et al.,* 2004; Alkhaledi *et al.,* 2008; Kasozi *et al.,* 2014; Gul *et al.,* 2015).

Lymphoid hyperplasia is responsible for the severe enlargement of the superficial lymph node at the early stage of the disease that occurred due to proliferation of microschizonts inside the lymphocyte caused inflammatory reaction in the infected lymph node (Ahmed *et al.,* 2008). In the present study, all cases were revealed pale mucous membranes displayed anemia that occurred due to the presence the intraerythrocytic piroplasms and caused distraction and the removal of these infected erythrocytes by reticulo- endothelial system (Singh *et al.,* 2001).

The most important unusual clinical appearance in this study is the ocular lesions that consisting of exophthalmos, lacrimation, swollen eyelids with exudate excretion, and some cases showed opacity of the corneas; these lesions are compatible with previous researchers that described the uncommon orbital lesions in *theileria annulata* (Baharsefat *et al.,* 1977; Vikrant *et al.,* 2012; Singh *et al,* 2012). Exophthalmos, due to theileriosis, has convicted to congenitally acquired *T. annullata* infection in across bred calf according to Vikrant *et al.,* (2012). They concluded that the *Theileria annulate* is transmitted from the immune carrier cow during the gestation period and similar to the phenomenon in *theileria equi* infection in horses, leading to stillbirth or full-term birth of live foal normal physiological function unenlarged non-oedematous superficial lymph glands (Allsopp *et al.,* 2007). Moreover, other researchers mentioned that calf develops the clinical disease of *theileria annulata* directly after birth or during early neonatal life (Baek *et al.,* 2003; Godara *et al.,* 2009). Transplacental / congenital bovine tropical theileriosis is considered an important emerging issue in a crossbred cow, especially in the geographical area with enzootic nature of the disease such as semi-arid regions of the South Asian countries (Vikrant *et al.,* 2012). In the present study, all cases were revealed an acute phase of tropical theileriosis. This observation agrees with previous studies that approved the production of high levels of cytokines from cells infected with *Theileria annulata*, such as tumor necrosis factor-alpha (TNF-a) (Brown *et al.,* 1995). This cytokine acts as the active producer of all major clinical signs of tropical theileriosis such as fever, anorexia, muscle wasting, and necrosis (Graham *et al.,* 2001). Moreover, these cytokines, TNF-a, are also responsible for escalating the eye lesions accompanied by the proliferation of the affected cells (Forsyth *et al.,* 1999). Additionally, infiltration of lymphocytes is also found to be contributed to the development of other eye lesions such as diplopia, proptosis, and ophthalmopathy with an accumulation of glycosaminoglycan (Bala´zs and Koranyi, 2011).

In the current study, all cases were treated with a single dose of Buparvaquone (2.5mg/Kg BW), accompanied with long-acting oxytetracycline and other supportive therapy such as multivitamin (AD3 A and vitamin E & selenium) and fluid therapy. Some cases were responded to the treatment; the others were worsened and died. These results are compatible with the results of the previous studies that showed recovery of the infected calf that used a single dose of Buparvaquone (Gupta *et al.,* 2004; Naik *et al.,* 2010).

In conclusion, this study focused on ten cases of bovine tropical theileriosis and its treatment, where the animals displayed uncommon clinical signs, especially acute orbital lesions. The authors recommend further epidemiological in Al Muthanna province, including the prevalence of theileriosis in small ruminants. Moreover, another study requires to investigate the epizootiological determinants and pathogenesis of the congenital bovine tropical theileriosis in the affected dams and her offspring.

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