
CLINICO-HEMATOLOGICAL FINDINGS OF HEAT STROKE IN A DOG

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ABSTRACT

Heat stroke is a clinical condition characterized by elevated body temperature and is also associated with a systemic inflammatory syndrome may ultimately leads to multiple organ failure and death. A German shepherd male dog of 3.5 years age was presented with the history of high body temperature (109°F), salivation and nervous symptoms. The blood picture revealed the presence of botryoid nucleus, meta rubricytes, pyknotic, karyolytic and karyorhectic white blood cells and apoptotic bodies. The case was diagnosed as heat stroke by considering the clinical signs and characteristic blood picture. In the present case, anamnesis suggesting heatstroke was lacking and the typical haematological picture aids in diagnosis.

Keywords: Botryoid nucleus, Dog, Heatstroke, Pyknotic nucleus

INTRODUCTION

Heat stroke is a clinical condition characterized by elevated body temperature greater than 105°F. It is also associated with a systemic inflammatory syndrome which ultimately leads to multiple organ failure and death (Bruchim *et al.*, 2008). It occurs due to improper heat dissipation after exposure to high environmental temperature or strenuous exercise (Bruchim *et al.*, 2017). It can occur in any dog breeds but is more commonly noticed in long haired breeds and brachycephalic breeds. Occurance is high in young dogs. This condition is common in dogs during summer months or due to vigorous exercise. Obesity, lack of acclimatization to hyperthermia, humid environment and lack of fitness are some of the important risk factors. (Horowitz, 2001). Heat stroke results in high body temperature followed by central nervous system disorders

(Mastrorilli *et al.*, 2013). Elevated body temperature can result in haematological variations as reported in this study; which can be beneficial in diagnosis

MATERIALS AND METHODS

A German Shepard male dog, 3.5 years old was presented to Veterinary Clinical Complex (VCC), College of Veterinary and Animal Sciences, Meerut with the history of high body temperature (109°F), salivation and nervous symptoms. Blood was collected in EDTA vial and submitted to the Diagnostic Laboratory of VCC for complete blood count (CBC). CBC was carried out manually according to standard protocols.

RESULTS AND DISCUSSION

Haemoglobin count was 12g/dl (Normal :12-18 g/dl), RBC count was $7.5 \times 10^6 / \mu\text{l}$ (Normal: $5.5-8.5 \times 10^6 / \mu\text{l}$), haematocrit was 36 per cent (Normal: 37-55 per cent) and total leukocyte count (TLC) was 8800/ μl (Normal: 6000-17000/ μl). On blood smear examination, mild anisocytosis was noticed with the presence of numerous nucleated RBCs (metarubricytes). There was lymphopenia with many leukocytes showing pyknosis, karyorrhexis and numerous apoptotic bodies were present (Fig.1a). All of the neutrophils had botryoid nuclei characterized by an increased number of segments of the nucleus and all

are radially arranged with fine chromatin networks (Fig. 1b). Nucleated RBCs are indicative of inappropriate rubricytosis. Blood smear picture was indicative of high body temperature. Hyperthermia can be pyrogenic or non-pyrogenic. In the present case, TLC was in normal range suggestive of non-pyrogenic increase in temperature. The case was presented during August with high environmental temperature recorded (max.38°C and min.25°C). The dog collapsed on the same day evening. The case was diagnosed as heat stroke by considering the clinical signs and characteristic blood picture. Earlier reports also suggest the presence of botryoid nuclei in heatstroke in dogs (Bruchim *et al.*, 2008; Mastrorilli *et al.*, 2013).

Heat stroke results in renal, hepatic and gastrointestinal damage and

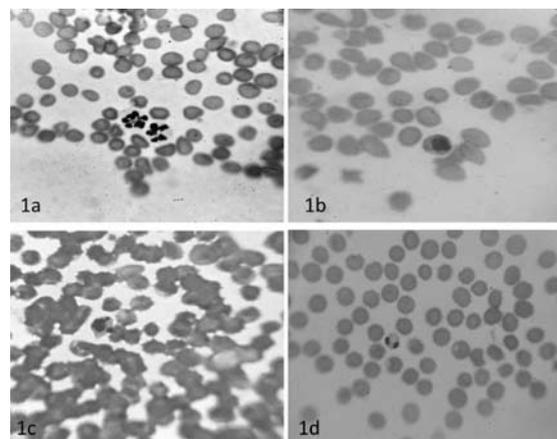


Fig.1a: Neutrophils with botryoid nuclei (Field stain, 1000x), **Fig. 1b:** Nucleated RBCs (Field stain, 1000x), **Fig. 1c and 1d.** Leukocytes showing pyknosis, karyorrhexis and apoptosis (Field stain, 1000x)

disseminated intravascular coagulation. The reason for the presence of nucleated RBCs (rubricytosis) is regenerative change, bone marrow injury, splenic contraction and lead toxicosis. Improper rubricytosis is a widespread finding in heatstroke of dogs and has been reported in 68 per cent of dogs in one retrospective study (Bruchim *et al.*, 2008; Aroch *et al.*, 2009). Increase in nucleated RBCs, maybe due to either bone marrow injury due to high body temperature or due to splenic contraction due to poor visceral perfusion. The presence of nucleated RBCs has been reported only in heat stroke cases of animals. Earlier reports are suggesting more than half of the cases occur in June, July and August (Chhabra *et al.*, 2008).

Heat dissipation in dogs occurs mainly by convection and radiation through the skin. Once the environmental temperature rises too high heat dissipation through the skin diminishes and panting becomes the main heat dissipation mechanism. Shock will result as a result of pooling of blood in liver and spleen and further ischemia of intestine and endothelial hyperpermeability (Bouchama and Knochel, 2002).

The present case anamnesis suggesting heat stroke was lacking and the typical haematological picture aided in

diagnosis. Alarming change in weather and climate patterns can result in higher number of heat stroke deaths in dogs. During summer months, adequate care should be taken by providing ventilated houses and free access to cold water to prevent heat stroke in dogs.

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