Case Report

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A Case of Exertional Rhabdomyolysis in an 11-year-old Argentine Mare

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ABSTRACT

Exertional Rhabdomyolysis is an imbalance between the animal's diet and its workload, especially when on a high-grain diet. An 11-year-old Argentine mare weighing 360 Kg was presented with a complaint of pyrexia, anorexia, pointed stance and stiff gait, reluctance to move and trembling when compelled to walk. On physical examination, body condition score of 2.5/5, excessive sweating, stiff hind quarters, and reluctance to move were observed. On clinical examination, the animal showed tachypnea, congested ocular mucous membrane and a temperature of 38.9°C. Blood sample was taken for complete blood cell count and biochemical test. The result of haematological test was within normal range while the biochemical test revealed hypoglycemia, hypochloremia, hyponatremia and hypokalemia. The levels of calcium, creatine kinase and bicarbonate were higher than the normal range. A diagnosis of azoturia was made based on history, clinical signs and laboratory test. The movement of the horse was restricted and it was treated with 0.6 mg/kg meloxicam daily for 5 days, 0.2mg/kg dexamethasone daily for 2 days, 12 ml of Vit ESe daily for 3 days and 60ml of Promin® daily for 3 days. The horse was given gentle walking exercise and low carbohydrate diet during the treatment period and normal function of the horse gradually returned 4 weeks after presentation. It was concluded that exertional rhabdomyolysis can be managed by administration of analgesic and anti-inflammatory, restricted carbohydrate diet and limited exercise until muscle function returns to normal.

Keywords: Exertional Rhabdomyolysis; Haematology; Biochemistry; Anti-inflammatory

INTRODUCTION

Exertional Rhabdomyolysis (ERM) is also known as azoturia, Tying-up and Monday morning disease (Valberg, 2016). It is most often seen when there is an imbalance between exercise and feeding, especially when a horse on a high energy diet is suddenly reduced on exercise levels (Knoepfli, 2002). Other risk factors include genetic susceptibility, vitamin and mineral deficiencies, hormonal disturbances, electrolyte imbalances, heavy musculature, nervous disposition, stress, age, and female sex (UpJohn *et al.,* 2005; Isgren *et al.,* 2010; Kosa *et al.,* 2021). Excess glycogen within the muscle cells of an inactive horse may lack oxygen and starts to function anaerobically to produce the needed Adenosine Triphosphate (Arighi *et al.,* 1984). This can result into build-up of lactic acid, waste products and heat which alters the cell by preventing the cell's enzymes from functioning and the myofilaments from contracting efficiently. A damaged cell membrane could allow muscle enzymes and myoglobin to leak into the bloodstream. Nephron may become blocked when myoglobi n is transferred to it which consequently leads to kidney failure (Norton *et al.,* 2016).

Symptoms of azoturia include unwilling to walk, unsteady or stiff hindquarters, collapse when trying to move, distressed behaviour such as excessive head throwing or pawing, tachycardia with raised pulse rate, reddish-brown or coffee-coloured urine and slight elevation in body temperature (Valentine *et al.,* 1999). Moderate to marked increased levels of three muscle enzymes, Creatine kinase (CK), Aspartate aminotransferase (AST) and Lactate dehydrogenase (LDH) are consistent with a diagnosis of ERM (Quist *et al.,* 2011, El-Ashker, 2012). Management includes providing the horse with water and inclusion of minimum level of grain, balanced vitamin and mineral levels especially vitamin E and selenium (El-Ashker, 2012). Grading the level of exercise with a slow increase in intensity helps to stimulate the delivery of oxygen to the muscles, and the removal of lactic acid from the muscles to the liver (Mckenzie *et al.,* 2020). This is a case report of exertional rhabdomyolysis in an 11year-old Argentine mare.

CASE PRESENTATION

Case History and Examination

An 11-year-old Argentine mare weighing 360 Kg was presented with a complaint of pyrexia, anorexia, pointed stance and stiff gait, reluctance to move and trembling when compelled to walk. On physical examination, the body condition score was 2.5/5, excessive sweating, stiff hind quarters, and reluctance to move were observed. On clinical

examination, the animal showed tachypnea, congested ocular mucous membrane and a temperature of 38.9ºC.

Laboratory Investigation

10 ml of blood sample was taken to determine haematological and serum biochemical parameters. 5 ml of the blood was dispensed into EDTA vacutainer tubes to determine red blood cell (RBC) counts, haemoglobin (Hb) concentration, packed cell volume (PCV) and total leucocyte and differential leucocyte counts using standard laboratory procedures. The remaining 5 ml of blood was collected in plain vacutainer tubes and serum was harvested after centrifugation at 1200 x G for 10 minutes. Serum concentration of glucose, cholesterol, calcium, sodium, chloride, potassium, bicarbonate and enzyme activities of creatine kinase, aspartate amino transferase and lactate dehydrogenase were determined using commercial tests kits (Egyptin Co. Cairo Egypt). The haematological profile of the horse obtained were within the normal range (Table 1). The result also showed hypoglycaemia, hyponatraemia, hypochloremia and hypokalemia. There was a moderate increase in the activity of creatine kinase and marked increase in calcium and bicarbonate levels from the normal range (Table 2).

Table 1: Haemogram of the 11-year-old mare with exertional rhabdomyolysis

Parameter	Observed Result	Normal Value*
PCV (%)	38	32 -48
RBC ($\times 10^6$)	6.1	6 -12
Hb (g/dL)	12.3	10 -18
WBC ($\times 10^9$/L)	8.6	6 -12
Neutrophil ($\times 10^9$/L)	4.1	3 -6
Lymphocyte($\times 10^9$/L)	3.9	1.5 -5
Eosinophil (($\times 10^9$/L)	0.51	0 -0.8
Monocyte($\times 10^9$/L)	0.24	0 -0.6

*Duncan and Prasse, 1977

Table 2: Biochemical parameter of the 11-year-old mare with exertional rhabdomyolysis

Parameter	Observed Result	Normal Value*
Glucose (mmol/L)	1.30	3.5 – 6.3
Cholesterol (mmol/L)	1.99	1.8 – 3.7
Sodium (mEq/L)	132.61	133 - 147
Calcium (mmol/L)	12.4	2.6 - 3.3
Potassium (mEq/L)	1.65	2.8 - 4.7
Chloride (mmol/L)	63.94	97 -110
Creatine kinase (u/L)	191.9	34 - 166
AST (u/L)	140.7	116 - 287
LDH (u/L)	240.0	102 - 341
HCO_3 (mmol/L)	54.32	22 - 29

*Boyd, 1984

Management

On the basis of the history, clinical signs and laboratory result, a diagnosis of exertional rhabdomyolysis was made. Movement of the horse was restricted and level of grain reduced. The hydration status of the mare was satisfactory, hence was not placed on fluid therapy. However, drinking of water was encouraged. The horse was administered with Meloxicam (Boehringer Ingelheim, Germany) at 0.6 mg/kg IV once daily x 5/7, VitESe (AdvaCare, China) at 12 ml IM once daily x 3/7, Dexamethasone (Symbiotec, India) at 0.2mg/Kg IV once daily x 2/7 and Promin® (Agrikhub, Nigeria) (amino acids, electrolytes and multivitamin solution) at 60 ml per os once daily × 3/7. The horse was given gentle hand walking during the treatment period for 10 minutes, 3 times a day. Normal function of the horse gradually returned 4 weeks after presentation.

DISCUSSION

The biochemical analysis revealed moderate elevation in the activity of creatine kinase (CK). Moderate increase in CK has ability to reveal muscle damage and is of great advantage in early disease process. (Stuck and Reinertson, 1987). The result obtained in this case was similar to that of Bayoumi, (2018) who reported an increase in CK in draft horses diagnosed of rhabdomyolysis in Egypt. CK is a reliable indicator for detection and monitoring of muscle damage in horses (Siciliano *et al.,* 2010). Hypoglycaemia was probably due to decrease in food intake during the time of presentation of the condition (Vetlexicon, 2021). The most common electrolyte abnormalities found with this syndrome are Hypochloremia, hyponatremia and hypokalemia (Arighi *et al.,* 1984). Sweat has high concentrations of these electrolytes, and often profuse sweating is found in horses with exertional myopathy (Hodgson, 1985). Hypercalcemia observed was in contrast with that of El-Deeb and El-Bahr (2010) who recorded hypocalcaemia in Arabian horses

diagnosed with equine rhabdomyolysis. Sweating in horses can also lead to high bicarbonate level. This is due to excessive loss of HCl, K and H_2O (Engelking, 2015). The use of Promin (amino acids, electrolytes and multivitamin solution) helped to keep the essential electrolytes balanced, provide essential amino acids, and multivitamin needed for normal neuromuscular function. Vit ESe injection administered is important since it acts as an antioxidant, thus, preventing cell damage (Biles, 2015). Dexamethasone, has a stabilizing effect on cell membranes and helps to prevent further muscle damage. Meloxicam is a non-steroidal anti-inflammatory drug of oxicam class and acts by inhibition of prostaglandin synthesis via preferential COX-2 inhibition (Beratta, *et al.,* 2005). The hand walking given to the horse during the treatment period helped to improve blood flow to the muscles, minimize scar tissue and muscle fibre adhesion formation (Bile, 2015).

Conclusion

Restriction of carbohydrate diet, provision of water, gradual introduction of exercise, administration of anti-inflammatory and analgesics are essential to manage exertional rhabdomyolysis in horses.

Authors' Contributions

ERE received and managed the case, while EMU sent the blood to the laboratory for analysis. Both authors wrote the draft manuscript. All authors have read and agreed with the content of the final manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

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