OBSERVATIONS ABOUT MYOPATHY IN MACROPODIDS

By Dr Howard Ralph and Dr Rosemary Austen

Myopathy and the circumstances of it's occurrence, recognition and treatment are well known as a common problem of Macropodids. Close observation of a number of kangaroos post rescue has indicated that myopathy is more common than previously thought and the relevant precipitants may be less dramatic or more subtle than expected. It may be manifest as skeletal myopathy and/or cardiomyopathy. Cardiomyopathy as the primary expression of the condition with subsequent sudden death is a common complication of being subject to relevant stressors. Early and rigorous treatment provides the best chance of recovery.

BIOGRAPHICAL STATEMENT

DR R AUSTEN

Dr Austen is a long term rescuer, care and rehabilitator of wildlife. She is a General Medical Practitioner and has been able to adapt and apply her medical skills to help wildlife. She has rescued many Macropodids, wombats, birds, reptiles, possums and echidnas and has taken a particular interest in the welfare and treatment of those suffering injury or illness.

DR H RALPH

Dr Ralph is a wildlife veterinarian and a medical practitioner. He has been rescuing and treating wildlife of all types for many years. He treats all species for any condition but has a particular interest in wildlife welfare, pain management and anaesthesia. He teaches at various institutions and also at seminars and training sessions for those interested in wildlife. He has attended disasters and other events involving wildlife in Australia, South Africa, Indonesia and Borneo.
He is currently based in NSW.

OBSERVATIONS ABOUT MYOPATHY IN MACROPODIDS

DR HOWARD RALPH

Capture myopathy, also known as exertional rhabdomyolysis or stress myopathy, is a condition particularly of kangaroos but also may affect other macropodids and other species.

There are similarities with exertional rhabdomyolysis in humans
- crush injury rhabdomyolysis in all species
- malignant hyperthermia in pig and humans
- azoturia in horses
- 'tying up' in horses and dogs

The two main components traditionally recognized as causes/precipitants, exertion and anxiety, are present in varying degrees. The level and duration of exertion or muscle activity may be minimal. The stress component is critical but may be subtle.

PHYSIOLOGICAL AND BIOCHEMICAL CHANGES

Muscle activity, due to exertion, exercise, cramping or tremor, and under the influence of adrenaline and other catecholamines, results in a change from aerobic metabolism (using oxygen) to anaerobic metabolism (without oxygen) and then,

→ lactic acidosis/other ketoacids → metabolic acidosis + hyperkalaemia (K+) → muscle damage + oedema

XS muscle activity (escape/shivering) → temperature rise/ K+

Heart muscle (myocardium) similarly affected → acute cardiomyopathy

Release of muscle pigment (myoglobin) from damaged muscle →
- brown urine (myoglobinuria)
- clogging of renal tubules
- changes in muscle structure

Circulatory changes → peripheral/ muscle/ pulmonary oedema
→ tissue ischaemia (poor blood flow)

→ poor venous return → hypovolaemic shock
→ acute heart failure
→ renal damage
→ tissue hypoxia (lack of oxygen)

These changes are then associated with
fear/stress
sudden death
muscle damage / weakness / stiffness
renal failure
compartment syndromes (tissue compression)
heart failure - acute or chronic
paralysis
liver damage
adrenal gland damage
brain damage
lymphatic system damage

There are changes also in a number of parameters used for investigation and diagnosis. Blood levels of CK (creatinine kinase, an enzyme from muscle), kidney function tests (urea, creatinine, electrolytes particularly potassium K+), blood gases and acid base balance(pH, O2, CO2, etc.), lactate and other organic acids and others. The ECG may change to show arrythmias (rhythm disturbances), ischaemia(poor blood flow) and cardiac muscle stress.

The outcome of being subjected to a precipitating stressor is variable but the prognosis is often poor and the patient may die very soon after exposure or show progressive signs for several months and eventually die. Treatment is available and if applied early may be effective to reverse the disease process.

Prevention is by far the best method of containing this disease. Avoidance of known and possible stressors should be practised. The following are examples of known stressors

Loud noises which are alien to the natural environment ….. machinary such as bulldozers, gun shots, motor vehicle engines, jack hammers, dropping or hammering metal sheets, fireworks, explosive devices, shouting, etc..

Being pursued by motor vehicles particularly motor cycles.

Being 'rounded up' and then corralled.

Sudden disruption of a group causing panic to ensue.

COMMENTS

Stress myopathy is probably more common than we have previously thought.

Awareness of the possible presence of a form of stress myopathy together with documentation of clinical signs following exposure to stressors and subsequent investigation of biochemical parameters of muscle damage, renal dysfunction, metaboloc acidosis, cardiac dysfunction etc., have enabled a more complete assessment of the frequency with which this condition occurs.

Early detection, suspicion of the possibility of stress myopathy, or provisional diagnosis thereof, enable prophylaxis and/or prompt treatment, leading to a better prognosis.
The insidious and relentless progression of the condition means that aggressive and persistent treatment are essential. Unfortunately there is still a significant mortality and morbidity associated with stress myopathy.

Kangaroos are particularly susceptible to this condition, and our experience suggests that it more common than previously thought. There seems to be an individual variation in the degree of susceptibility.

The exertional component may be very minimal but stressors that are significant to the patient are of prime importance. Sometimes a stressor percieved as more than trivial, by the kangaroo, may be very subtle and difficult to recognize by humans except retropectively. Such stimulii as excitement reaction by another adjacent kangaroo or handling by an unfamiliar human may be precipitants.

Overt signs of stress such as shivering, forearm licking, vocalizing and increased vigilance may be present and observed, or be minimal, but the late occurrence of renal and/or cardiac failure become apparent and often progress to a fatal outcome.

MANAGEMENT

Management includes treatment with medication and invocation of other measures particularly to moderate the stress.

Medications used include the following that are administered on an individual basis depending on the patient, circumstances and potential degree of reaction.

Diazepam for sedation and anxiolysis
Midazlam "
Corticosteroids to stabilise vascular capillaries and assist analgesia
Analgesia to manage pain and therefore stress
Sodium bicarbonate (Na HCO3) to modify acidosis and encourage urine output
fluids paricularly parenterally to help flush the kidney and support the circulation. Must not contain potassium K+.
diuretics (eg frusemide) to increase urine output and reduce potassium
selenuium and vitamin E may help protect muscle
oxygen if practical particularly in early stages
glucose to reduce ketone production and acidosis
others to improve renal function, support cardiac function and increase coronary flow, direct blood flow, regulate blood pressure
antibiotics if indicated

Other management includes,

Measures to moderate stress
- bottle feeding
- support in a pouch
- quiet environment
- known carers only
- remove stressors

Monitor and manage hyperthermia
Collect urine for regular testing

CONCLUSIONS

Stress myopathy is common in kangaroos.
The cardiomyopathic component of the disease is more common than previously thought.
Recognition of potentially stressful situations should prompt the use of prophylactic intervention, such as adequate sedation with an anxiolytic medication prior to tranlocation, travel, veterinary treatments and post operative recovery. Early treatment with the same group of medications is beneficial during, or at least following, rescue, trauma and events provoking any evidence of stress reaction.
As stress myopathy is associated with a number of human activities that may be avoided or at least modified, there is a strong animal welfare component to any discussion of prevention of this potentially fatal and debilitating condition.

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IN MACROPODIDS

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