Capture Myopathy in a Red-Necked Wallaby (Macropus rufogriseus)

Ji-Yong Kim¹, Suk-Hun Oh², Yang-Beom Kim*, Soo-Whan Kwon*,
Hyang Jee, Dae-Yong Kim and Nam-Shik Shin¹

College of Veterinary Medicine, Seoul National University, Seoul 151-742, Korea
*Samsung Everland Zoo, Gyeonggi 449-715, Korea

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Abstract: This case report describes capture myopathy in an 8-month-old female red-necked wallaby (Macropus rufogriseus) that died after a 14-day history of depression, lameness and astasia following a bathing protocol for dermatitis. In a blood test performed the day after the wallaby fell down, serum chemistry showed a normal range of LDH but elevated CK, ALT and AST. Upon histopathologic examination after the animal's death, we found degeneration and necrosis of myofibers in skeletal muscle and myocardium. According to history that the wallaby was pressed by other individuals, suspected vitamin E insufficiency in the diet, physical stress during bathing as well as results of a blood test and microscopic examination, we diagnosed this case as capture myopathy. Although capture myopathy is a common problem in marsupials, this is the first reported case in Korea and understanding this case will help to manage future cases of capture myopathy in captive settings in Korea.

Key words: capture myopathy, red-necked wallaby, stress, vitamin E, rhabdomyolysis.

Introduction

Capture myopathy, also called excertional rhabdomyolysis, is a metabolic muscle disease that is characterized by degenerative or necrotizing damage to the muscles from an increased myocyte production of lactic acid when oxygen is depleted and anaerobic metabolism occurs (2,6). The cause of disease is associated with extreme exertion or stress during the capture process (3,6). Clinical signs of muscle damage include ataxia, paresis and paralysis, and a cascade of complications such as lactic acidosis, renal failure, cardiac arrhythmia and death may occur (2).

Capture myopathy has been documented in many animals including ungulates, carnivores, rodents, primates, pinnipeds, birds and marsupials (6). Myodegeneration, caused by capture, stress and deficiency of vitamin E or selenium, is one of the most common problems in zoo animals and mainly affects hoofed stock and marsupials (1).

This case report describes capture myopathy in a red-necked wallaby that was raised in a zoo. The wallaby was fed a daily total of 800 g of food that included vegetables such as carrots, cabbage, sweet potatoes and apples as well as alfalfa hay and pellets that were formulated specifically for marsupials. The wallaby emerged from the pouch at 2 months of age exhibiting seborrheic dermatitis, and many scales were observed on her skin (Fig 1). We cultured hairs taken from skin lesions in an enriched dermatophyte medium (InTray™ DM, BioMed Diagnostics, USA). After 4 days we observed a reddish change in the colonies' growth (Fig 2A). Under microscopic examination we found macroconidia and microconidia with separated hyphae (Fig 2B), but we did not conduct further testing to identify the genus of the fungus. To treat the dermatitis we bathed the animal with ketoconazole shampoo (NITOZOL SHPO, Korea Pharma, Korea) twice at 12 days interval. After 3 days of bathing, the wallaby showed clinical signs of pyatism, dyspnea, depression, lameness and ataxia.

Case

An 8-month-old intact female red-necked wallaby (Macropus rufogriseus) was raised in a zoo. The wallaby was fed a daily total of 800 g of food that included vegetables such as carrots, cabbage, sweet potatoes and apples as well as alfalfa hay and pellets that were formulated specifically for marsupials. The wallaby emerged from the pouch at 2 months of age exhibiting seborrheic dermatitis, and many scales were observed on her skin (Fig 1). We cultured hairs taken from skin lesions in an enriched dermatophyte medium (InTray™ DM, BioMed Diagnostics, USA). After 4 days we observed a reddish change in the colonies' growth (Fig 2A). Under microscopic examination we found macroconidia and microconidia with separated hyphae (Fig 2B), but we did not conduct further testing to identify the genus of the fungus. To treat the dermatitis we bathed the animal with ketoconazole shampoo (NITOZOL SHPO, Korea Pharma, Korea) twice at 12 days interval. After 3 days of bathing, the wallaby showed clinical signs of pyatism, dyspnea, depression, lameness and ataxia.

Fig 1. Severe seborrheic dermatitis with the formation of yellow-brown crusts.
Fig 2. After 4 days of incubation. (A) Reddish change with colony growth in Intrap™ DM media. (B) Grouped microconidia and spiral hyphae (× 100).

Table 1. Result of CBC and serum chemistry

<table>
<thead>
<tr>
<th>Item</th>
<th>Result</th>
<th>Reference range</th>
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<tbody>
<tr>
<td>WBC (× 10⁹/µL)</td>
<td>10.74</td>
<td>5.728 ± 2.226</td>
</tr>
<tr>
<td>RBC (× 10⁹/µL)</td>
<td>4.79</td>
<td>5.38 ± 0.74</td>
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<tr>
<td>PCV (%)</td>
<td>33.2</td>
<td>47.7 ± 7.4</td>
</tr>
<tr>
<td>CK (IU/L)</td>
<td>&gt; 2000</td>
<td>1371 ± 1819</td>
</tr>
<tr>
<td>ALT (IU/L)</td>
<td>&gt; 1000</td>
<td>45 ± 26</td>
</tr>
<tr>
<td>AST (IU/L)</td>
<td>697</td>
<td>88 ± 71</td>
</tr>
</tbody>
</table>

*ISIS March 2002, International species information system; 12101 Johnny Cake Ridge Road, Apple valley, MN 55124, USA

When forced to stand, she remained standing for only 2 to 3 hours and then fell down again.

We performed a complete blood cell count (CBC; Hemavet 950, Drew Scientific Group, USA) and a serum chemistry (Fuji Dry Chem3500i, FUJI PHOTO FILM CO., Japan). The results of the CBC and serum chemistry showed increased WBC, decreased PCV and elevated CK, ALT and AST (Table 1), other levels were within normal ranges. The wallaby did not respond to fluid therapy. She continued to show lameness and astasia, and she died after 14 days of treatment.

We conducted a postmortem examination of the wallaby. Skeletal muscles and myocardium were fixed in 10% buffered formalin, routinely processed, embedded in paraffin, sectioned at 5 µm thick and stained with hematoxylin and eosin (Fig 3).

On microscopic examination, degeneration and necrosis of myofibers were found in the femoral muscle. Muscle fibers were swollen, segmented and lost their striation. Infiltration of macrophages and fibrosis were seen in the lesion (Fig 3). A focal myocardial necrosis and mineralization were found in the heart lesion.

Discussion

Stress, exertion and crush injury are well-documented causes of rhabdomyolysis. However, other major factors contribute to the development of capture myopathy in wildlife, including procedures that involve long periods of restraint, struggling from unnatural positioning and lengthy pursuit during capture (6). The wallaby in this case study had severe dermatitis when she emerged from the pouch, and she was physically pressed by other individuals that lived together. We suspect that severe stress from capture and restraint during bathing caused capture myopathy in this situation. In addition, we believe that myopathy was intensified because of a vitamin E insufficiency in the animal's diet. Macronpods have an absolute need for dietary vitamin E. Complete marsupial feeds such as Mazuri Marsupial Pellet (PMI Nutrition International, Inc., Brentwood, MO) are supplemented. However, nonmarsupial herbivore pellets necessitate vitamin E supplementation at 200 mg to 600 mg of vitamin E per day for adult macropods (5). The wallaby was fed a diet of vegetables and nonmarsupial pellets, and no vitamin E or selenium supplements were provided.