Congenital nutritional myodegeneration in a Cypriot mouflon (Ovis orientalis ophion) lamb

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SUMMARY
A five days old Cypriot mouflon (Ovis orientalis ophion) lamb was found dead without premonitory signs in the Platania mouflon enclosure. Necropsy revealed generalized pale discoloration of skeletal muscles and to a lesser extent of the myocardium. Extensive and severe muscular degeneration and necrosis were evidenced by histology. Liver selenium and vitamin E contents were 0.23 mg/kg and 21 mg/kg, respectively. Based on the post mortem findings, the diagnosis of white muscle disease was established and was presumptively attributed to vitamin E deficiency by comparison with usual values obtained in other zoo ruminants. It is the first reported case of white muscle disease in any mouflon species, and particularly in the wild Cypriot mouflon that is endangered and under strict surveillance.

Keywords: Endangered species, Cypriot mouflon, congenital form, nutritional myodegeneration, selenium, vitamin E deficiency.

RÉSUMÉ
Myopathie dégénérative nutritionnelle congénitale d’un jeune mouflon Chypriote (Ovis orientalis ophion)

Un jeune mouflon chypriote (Ovis orientalis ophion) de 5 jours a été retrouvé mort, sans signe prémonitoire, dans un enclos pour mouflons de Platania. L’autopsie a révélé une pâleur généralisée des muscles squelettiques et à un degré moindre du myocarde. Des lésions musculaires dégénératives et nécrotiques intenses et étendues ont aussi été mises en évidence à l’histologie. Les concentrations hépatiques de sélénium et de vitamine E ont été respective-ment de 0,23 mg/kg et de 21 mg/kg de foie. Le diagnostic de la « maladie du muscle blanc » a été établi sur la base des observations post-mortem et l’étiologie en serait une carence en vitamine E par comparaison avec les valeurs usuelles obtenues chez d’autres espèces de ruminants sauvages. Il s’agit donc du premier cas rapporté de maladie du muscle blanc chez le mouflon, toutes espèces confondues, et en particulier chez le mouflon chypriote qui est une espèce menacée et soumise à une surveillance stricte.

Mots clés : Espèces menacées, mouflon chypriote, forme congénitale, myopathie dégénérative nutritionnelle, sélénium, carence en vitamine E.

Introduction

Nutritional myodegeneration (white muscle disease, WMD) results from selenium and/or vitamin E deficiency and affects a wide range of domestic and wild animal species including sheep, goats, cattle, deer, horses, swine, poultry, rabbits, mar- supials, monkeys, laboratory and exotic animals, monkeys and even fish [8, 12, 15]. It is a degenerative disease of the striated muscles, without neural involvement. Lesions are probably initiated following free-radical damage [8, 20]. In ruminants, two clinical forms of the disease are recognized, the congenital and the delayed form [8, 12]. The former affects neonatal ani-mals, which are stillborn or weak and usually die soon after birth, while the latter affects animals older than 3 weeks of age [12, 15].

The Cypriot mouflon or agrino (Ovis orientalis ophion) is a wild sheep species endemic and unique to Cyprus. According to historical records, it has been present in the island for at least 10,000 years and is of Asiatic origin. It is the largest terrestrial mammal found in Cyprus [14, 21]. It is smaller than other wild sheep, the male weighing 35-45 kg and the female 25-35 kg; the males bear supracervical horns while the fe-males are hornless. The current mouflon population is estimated to be approximately 3,000 animals. Mouflon inhabit the Paphos forest, a mountainous area of 620,000 ha in the North-western part of the Troodos mountain range. Along with the mouflon of Sardinia and Corsica (Ovis gmelini mus-simon) it is the only forest dweller among the Caprinae [6, 14].

The species’ health is closely monitored by the Game Fund Service in collaboration with the Department of Cyprus Veterinary Services. Under Cypriot legislation, it is a strictly protected species and has been included in Annex II/IV of 92/43 EU Habitats Directive, as a European priority species. It is also referred as endangered under the International Union for the Conservation of Nature 1996 Red list [18]. All deaths ob-served in recent years are recorded and its population status monitored. Furthermore, the Cypriot mouflon is one of the symbols of Cyprus, even featuring on the Cyprus Euro coin,
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a fact that may indeed help its survival. On the other hand, it can also be threatened by likely transmission of infectious agents from domestic ruminants in shared pastures. To date, there is little information on its physiology and pathology, whether free-ranging or semi-enclosed.

To date white muscle disease has not been diagnosed in Cypriot mouflon or other mouflon species. This short paper describes a case of congenital white muscle disease in a Cypriot mouflon lamb and its clinical and pathological findings.

Clinical Case

CASE HISTORY

A five days old mouflon lamb was found suddenly dead in the Platania mouflon enclosure in Cyprus. No signs of disease were observed prior to death. The enclosure also contained 3 adult males and one female mouflon sheep. The adults were free-ranging in a 2.7 hectare area and were additionally provided with alfalfa hay *ad libitum* and concentrate mixture not containing extra vitamins, macro- or micro- minerals, while the aforementioned lamb was suckling.

POST MORTEM AND LABORATORY FINDINGS

Necropsy revealed a generalized pale discoloration of skeletal muscles (figure 1), and myocardium. Histopathological examination showed severe and extensive myodegeneration and necrosis of the skeletal muscles, as well as extensive mineral deposition (figures 2a and 2b); degeneration was also observed in the myocardium, albeit to a markedly lesser degree and extent. Based on the above, the diagnosis of white muscle disease was established. Liver selenium and liver vitamin E contents (determined by fluorometry) were 0.23 mg/kg and 21 mg/kg of liver weight, respectively.

Discussion

White muscle disease in the Cypriot mouflon lamb was diagnosed based on the observed gross and histological lesions. Findings similar to the ones described here have been described for white muscle disease in other ruminant species, in Greece and other countries. Sudden death can be attributed to heart failure, a condition that also seems to be common in other WMD cases in ruminants [9, 15].

To date, most reported cases of WMD in young animals of various ruminant species, such as calves, lambs, kids and deer calves have mainly been attributed to selenium deficiency or combined selenium and vitamin E deficiency [1, 4, 15, 17]. However, a smaller number of WMD cases in lambs and zoo ruminants have been attributed solely to vitamin E deficiency [3, 5, 9, 10, 13, 19].
In the present case WMD can be presumptively attributed solely to vitamin E deficiency. Reference values for selenium and vitamin E are not currently available for the Cypriot mouflon or other mouflon species. However, although knowledge based on sheep or other ruminants cannot necessarily be extrapolated for the Cypriot mouflon, the liver selenium value obtained falls within the usual values measured in various other ruminant species [11, 17] and may therefore be presumed to be normal. On the contrary, the liver vitamin E concentration measured was lower than the reported usual values for lambs [5]. However, the vitamin E content in liver measured in the reported case was not as low as in lambs with clinically manifested vitamin E deficiency [5]. This could indicate increased requirements for vitamin E in the Cypriot mouflon. A similar condition occurs in other ruminant zoo species, such as Bovidae (antelopes), Cervidae (deer species), Elephantidae and Rhinocerotidae [2]. Firmer conclusions, however, cannot be drawn at this stage due to the lack of reference values for healthy free-ranging and semi-enclosed Cypriot mouflon. The findings may not be surprising given that the disease is well described in domestic sheep; however, as stated above, the mouflon is a wild sheep species, little is known about its pathology, and there is no information regarding its nutritional needs when semi-enclosed.

Apart from expanding on comparative aspects of ruminant pathology, this report is, to our knowledge, one of the few reports of disease concerning the Cypriot mouflon [7]. In endangered animals, diseases may constitute the single greatest threat to the species’ survival [16]. The survival of the species will in part depend on the maintenance of the population in good health, whether free-ranging or enclosed. Recognition of the conditions affecting the Cypriot mouflon, such as the one described here, is a necessary step in the design, implementation and, ultimately, the success of health monitoring strategies.

As a conclusion, congenital white muscle disease can cause sudden death in neonatal Cypriot mouflon lambs. The diagnosis is based on the gross and histological findings that are similar to the ones described in WMD in other species while the disease may be attributed to vitamin E deficiency. Recognition of the conditions affecting the Cypriot mouflon, such as the one described here, is a necessary step in the design, implementation and, ultimately, the success of health monitoring strategies.

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References


