Polioencephalomalacia associated with closantel overdosage in a goat

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ABSTRACT

This report describes clinical and pathological findings associated with closantel (a halogenated salicylanilide anthelmintic) overdosage in a 3-year-old goat. The clinical signs included blindness, incoordination, ataxia, depression of the palpebral and pupillary reflexes, and recumbency. No gross lesions were noted in tissue or organs at necropsy, but microscopic lesions were seen in nervous tissue and hepatic cells. Polioencephalomalacia was clearly evident. Bilaterally symmetrical status spongiosus of the white matter of the brain, bilateral laminar necrosis, microcavitations, ischaemic cell change and severe degeneration of the cerebellum were seen in nervous tissue. Fatty change and hydropic degeneration in the liver and hepato-cellular degeneration were observed histologically.

Keywords: closantel, goat, polioencephalomalacia.

Sakhaee E, Derakhshanfar A **Polioencephalomalacia associated with closantel overdosage in a goat**. *Journal of the South African Veterinary Association* (2010) 81(2): 116–117 (En.). Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Kerman, Iran.

INTRODUCTION

The halogenated salicylanilides are a group of compounds developed mainly for their antiparasitic activity in animals. Closantel and rafoxanide, which represent the most important drugs in this group, are used extensively for the control of *Haemonchus* spp. and *Fasciola* spp. infestations in sheep and cattle and *Oestrus ovis* in sheep in many parts of the world[7]. Clinical signs of closantel toxicity in small stock include inappetence, ataxia, paresis, recumbency, and blindness[2]. Histologically, widespread spongy changes (status spongiosus) in the central nervous system, optic neuropathy and retinal degeneration have been described. Acute retinal lesions consist of papilloedema, necrosis of the outer retinal layers and retinal separation in tapetal and non-tapetal areas[8]. However, to the authors' knowledge, there is no report of polioencephalomalacia/cerebrocortical necrosis (CCN) due to closantel poisoning in the veterinary literature.

This publication is the 1st report of polioencephalomalacia associated with closantel overdosage in goat. It describes the progressive development of lesions in the brain and liver in a case of closantel poisoning in a goat.

CASE HISTORY

In October 2007, a 3-year-old goat with a history of closantel (Nasr®, Fariman, Iran) overdosage was referred to the Teaching and Research Hospital of Veterinary Medicine Faculty, Shahid Bahonar University of Kerman, Iran. The clinical findings were characterised by blindness, depression, head pressing, circling, teeth grinding, incoordination, ataxia, depression of the palpebral and pupillary reflexes, nystagmus, and dilated pupils, muscle tremors, frothy salivation and recumbency. In this case, marked opisthotonus, extension of the limbs, hyperaesthesia and periodic tonic-clonic convulsions were observed. The rectal temperature and heart rate were 39.8 °C and 98 pulses per minute respectively.

Accurate information on the doses administered could not be obtained, but, from inquiries made, it seemed likely that the recommended dose (10 mg/kg, 1 mℓ/5 kg live body weight orally) had been exceeded by up to 8 times. This product had been stored below 25 °C (room temperature) in the closed, original container in a dry, well-ventilated area, and protected from sunlight and its expiry date was at the end of June 2009.

Because of the poor body condition of the animal, the owner selected euthanasia. After necropsy, samples were fixed in 10 % neutral buffered formalin and then submitted to the pathology laboratory. After fixation, tissue samples were embedded in paraffin wax, and sections (5–6 μm) were cut and stained with haematoxylin and eosin (H&E).

RESULTS

Gross lesions

No gross lesions were noted in tissues or organs at necropsy.

Histological lesions

Brain. The lesions were widespread in cerebral cortex, with polioencephalomalacia (CCN) being obvious (Fig. 1). There was bilateral symmetrical status spongiosus of the white matter of the brain, microcavitations and bilateral laminar necrosis (Fig. 2). Ischaemic cell change and severe degeneration of the cerebellum were seen in nervous tissue (Fig. 3).

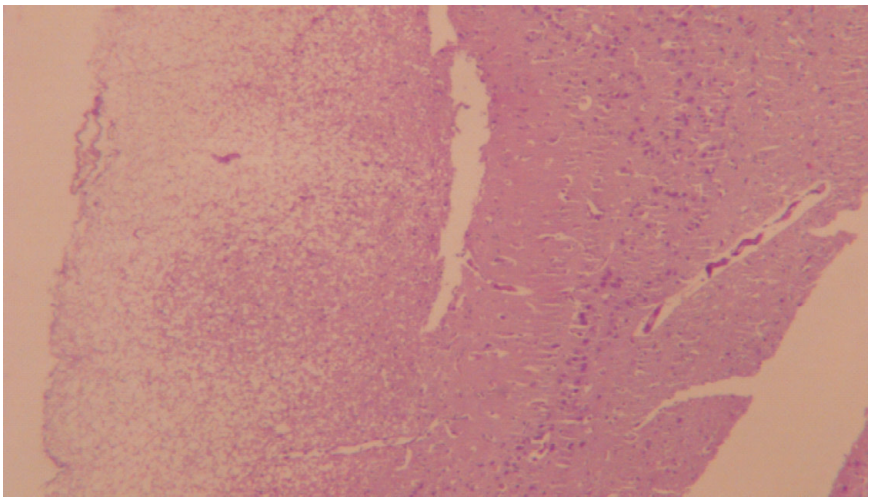

Fig. 1: **Polioencephalomalacia. Microcavitation is evident as a poorly stained area.** H&E, ×4.

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Received: November 2008. Accepted: March 2010.

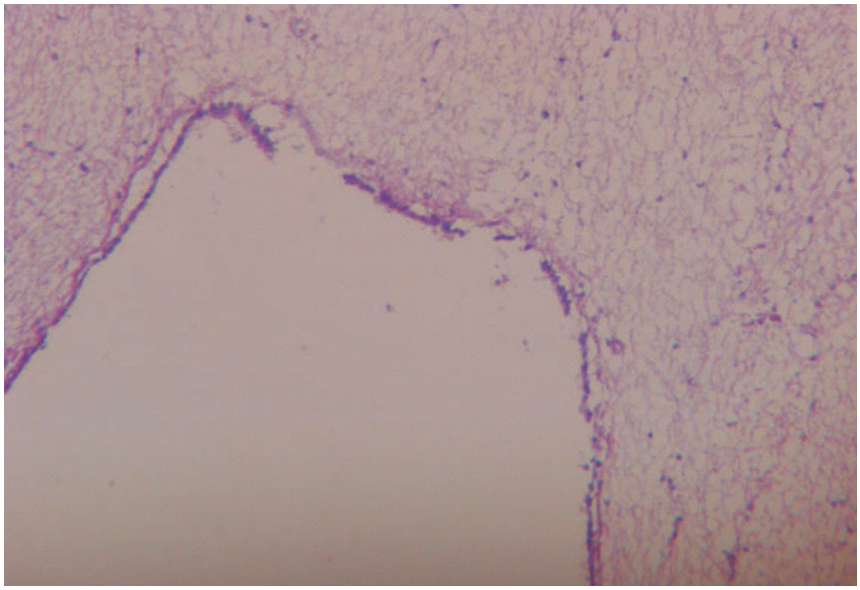

Fig. 2: **Polioencephalomalacia. Demyelination and status spongiosus in the periventricular tissue.** H&E, ×400.

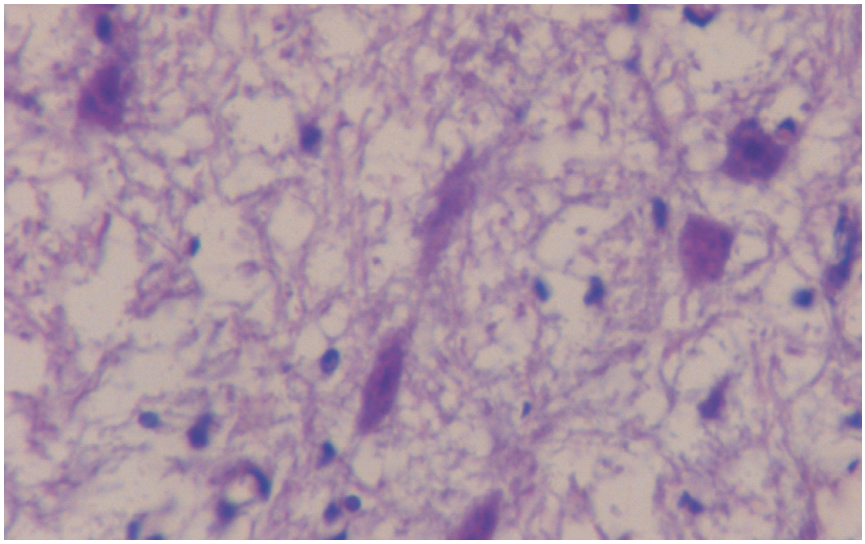

Fig. 3: **Polioencephalomalacia. Neurons have shrunken cell bodies, and dark and shrunken nuclei typical of the ischaemic cell change**. H&E, ×400.

Liver. Fatty change and hydropic degeneration in the liver and hepatocellular degeneration were observed.

Other organs and tissues. No significant lesions were evident.

DISCUSSION

The findings in this case of accidental closantel poisoning, and status spongiosus of the cerebral and cerebellar white matter, were similar to those in previous studies[3,6,8]. However, polioencephalomalacia (CCN), fatty change and hydropic degeneration in liver and hepato-cellular degeneration have not been reported previously. Polioencephalomalacia is a neuropathologic condition of ruminants that can be induced by a variety of neural metabolic disruptions. These include altered thiamine status, water deprivation, sodium ion toxicosis, lead poisoning and high sulphur intake[4]. The anthelmintic spectrum of closantel has been linked to the compound's ability to uncouple oxidative phosphorylation, but it is not known whether this mechanism could account for the toxic effects in sheep and goats[1,7]. A primary myelinotoxic effect of salicylanilides on the myelin sheath, especially with vacuolation resulting from overdosage, cannot be excluded[5].

ACKNOWLEDGEMENTS

This research was financially supported by research council of Shahid Bahonar University of Kerman.

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