VETERINARY CLINICAL SCIENCE
Journal homepage: www.jakraya.com/journal/vcs

CASE REPORT

Successful Management of Levamisole Toxicity in Sheep: A Case Report

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Received: 02/09/2020
Accepted: 25/09/2020

Abstract

Levamisole is a broad range imidathiazole anthelminthic drug effective against a large number of endoparasites. It has a high efficacy against nematodes. However, it has a narrow margin of safety which warrants its cautious and judicious use in livestock. The present case reports details the toxicity of levamisole over dosage when used as a drench in sheep flock. Out of nine sheep owned by the farmer, four had collapsed just after levamisole overdose, while five sheep presented to ICAR-CIRG with a history of muscle tremors, incoordination, staggering gait, hyperaesthesia, anxiety, increased respiratory rate, dyspnea, head shaking, etc. The diagnosis of levamisole toxicity was based on the clinical signs and history of levamisole overdose. Four out of the sheep presented to ICAR-CIRG were saved by timely administration of atropine sulphate, thiamine, pyridoxine, cyanocobalamine and normal saline. These four sheep recovered in 5 days and showed apparently normal physiological behaviour.

Keywords: Levamisole, Toxicity, Overdose, Sheep.

1. Introduction

Levamisole is a broad range imidathiazole anthelminthic drug effective against a large number of endoparasites (Adediran and Uwalaka, 2015). It has a high efficacy against lung and gastrointestinal nematodes and some microfilarial infections of the livestock (Elliot *et al.*, 1987; Coles *et al.*, 1989; Chartier *et al.*, 2000). Levamisole causes depolarisation of the ganglions and nervous cells of the worms leading to spastic paralysis of worms. It also interferes with the metabolism of carbohydrates (sugars) in the worm by inhibiting the enzyme fumarate reductase, creating an energy deficiency in the parasite. Within 1 to 3 hours after administration, the worms are paralyzed or dead and are expelled. Levamisole offers an additional advantage over other common anthelmintics by stimulating the cell mediated immunity (CMI) in immunologically incompetent animals. Since it is reasonably soluble in water, it can be easily formulated for several delivery forms advisable for mass administration like feed additives, drenches, injectables, tablets, pills, etc. Moreover, it is comparatively cheaper than other anthelmintics, making it more attractive for the poor small ruminant rearers. The usual dose rate of levamisole in sheep and goats is 8 mg/kg body weight, which is often increased upto 12 mg/kg body weight for nematode control (Pugh and Baird, 2012). Levamisole has a narrow margin of safety which warrants cautious and judicious use of the drug in livestock. Its parenteral overdose may be lethal and can cause death while its oral overdose may produce nervous symptoms. Several cases of levamisole toxicity have earlier been reported (Babish *et al.*, 1990). This anthelmintic is one of the most common potential causes of neurotoxicity in sheep, goat, cattle and pigs (Nielsen and Rasmussen, 1983). Levamisole is a ganglion stimulant, thereby leads to excessive stimulation of nervous symptom. Levamisole causes prolonged depolarisation and neuromuscular blockade. The overdose clinical syndrome is comparable to nicotine poisoning with signs including anxiety, hyperesthesia, increased urination and defecation, muscle tremors, staggering gait and convulsions (Hsu, 1980; Radostits *et al.*, 2007). Due to its narrow margin of safety levamisole should be used cautiously and judiciously in livestock especially sheep and goats. The present case reports details the toxicity of levamisole over dosage and its clinical management in sheep.

2. Case History

A sheep owner of Mathura District, maintaining a flock comprising of 9 non-descript adult sheep (weighing about 40 Kg) had dewormed all the 9 adult sheep orally with levamisole (Levamisole HCl powder 30% w/w) dissolved in water. Each sheep was administered around 5g of levamisole dissolved in water, in comparison therapeutic dose of 8 mg/ kg body weight. Approximately five times of the recommended dose was given to adult sheep, which resulted in clinical toxicity. Out of the total adult flock drenched, four sheep exhibited acute toxicity within 3-6 hours of administration. First clinical signs of toxicity appeared within 3 hours of levamisole administration. Sheep showed bizarre neurological symptoms of hyperaesthesia, muscle tremors, staggering gait, increased respiratory rate, dyspnoea, head shaking followed by death within 18 hours of drug overdosing. Five remaining sheep were presented to the Division of

Animal Health, ICAR-CIRG, Makhdoom with a history of muscle tremors, incoordination, staggering gait, hyperaesthesia, anxiety, increased respiratory rate, dyspnoea, head shaking etc. A thorough physical examination was carried out and the vital parameters were noted down for the five surviving animals viz: Rectal temperature (ranged from 99-101^{o}F), heart rate (ranged from 120-180 beats/min) and respiratory rate (ranged from 72-81 cycles/min).

3. Management of Levamisole Toxicity

Levamisole toxicity in the host animal is largely an extension of its antiparasitic effect, i.e. cholinergic-type signs of salivation, muscle tremors, ataxia, urination, defecation, and collapse. In fatal levamisole poisoning, the immediate cause of death is asphyxia due to respiratory failure. So to manage the levamisole toxicity mainly anticholinergic drug atropine was used for instant relief and life saving. In addition to atropine, vitamin B complex was administered to serve as nervine tonic to the fatigued nervous system. Due to excessive defecation and urination, the animals were dehydrated. So, normal saline was infused intravenously for rehydrating the animals.

Fig 1: Levamisole toxicity in sheep.

Fig 2: Incoordination and staggering gait.

4. Treatment

Five sheep presented to ICAR-CIRG were administered timely with atropine sulphate @ 0.04 mg/kg body weight subcutaneously BID with normal saline for 2 days. A combination of thiamine (150 mg), pyridoxine (150 mg) and cynocobalamine (1500 mcg) was administered intramuscularly twice daily as nervine tonic for 3 days. By well-timed administration of atropine sulphate, thiamine, pyridoxine, cyanocobalamine and normal saline four out of the five sheep recovered in 3 days without any complications and showed apparently normal physiological behaviour.

5. Conclusion

Levamisole toxicity in five sheep was promptly treated and four sheep recovered without any complications. The livestock owners must use dewormers under the strict supervision of veterinarians after recording body weights of the animals. The present report necessitates the correct dosing of anthelminthics like levamisole which have a narrow margin of safety.

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