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Authors: MAGONIGLE, ROBERT A., STAUBER, ERIK H., and VAUGHN, HARRY W.

Source: Journal of Wildlife Diseases, 13(3) : 258-261

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-13.3.258

THE IMMOBILIZATION OF WAPITI WITH ETORPHINE HYDROCHLORIDE[1]

ROBERT A. MAGONIGLE, ERIK H. STAUBER and HARRY W. VAUGHN,
University of Idaho Agricultural Experiment Station, Department of Veterinary Science,
Moscow, Idaho 83843, USA

Abstract: Data and observations on the use of Etorphine hydrochloride (M99) (in combination with Acepromazine) and its antagonist M50-50 for immobilization of captive elk (*Cervus elaphus canadensis*) are presented. The study period covers 3 years during which 8 adult elk were immobilized 52 times with M99. The average dose of M99 administered for each immobilization was 2.2 mg per 100 kg body weight. Reversal with M50-50 was effected by an average dose of 4.4 mg per 100 kg body weight. Induction averaged 5.9 minutes while reversal took an average of 4.6 minutes.

INTRODUCTION

Etorphine hydrochloride (M99)[2] has been widely used as an immobilizing agent in numerous species of wild animals.[1,6,8] The drug has been shown to have a wide margin of safety and its effects are readily reversible by the antagonist, M50-50[3] (diprenorphine).[1,5] The use of M99 in elk (*Cervus elaphus canadensis*) has been previously reported[2,8,9] and the purpose of this report is to provide additional data on the effects of M99 when used on captive elk. The observations presented were made while the elk were being utilized in veterinary research projects that required immobilization of the animals.

MATERIALS AND METHODS

Experimental Animals

Six adult male and 2 adult female maintained at the University of Idaho were utilized in the study. Animals ranged from 1.5 to 6 years in age.

Drug Administration and Dosage

All administrations of M99 were made intramuscularly (I.M.) by projectile syringe from a powder charged long range rifle.[4] Projectiles were fired into the deep muscle of the hip when elk were at a range of 20 to 30 meters. M99 and M50-50 were supplied as solutions of 1 mg/ml and 2 mg/ml concentrations respectively. Acepromazine maleate[5] was supplied in a solution of 10 mg/ml concentration. The immobilizing dose administered an average of 2.2 mg of M99 in combination with 2.2 to 3.3 mg acepromazine per 100 kg body weight. The antagonist, M50-50, was administered intravenously (I.V.) at 4.4 mg per 100 kg of body weight.

Evaluation of Drug Efficacy

Evaluation of the efficacy of M99 in inducing immobilization in elk was based on 4 parameters; the induction period (time needed from injection until

[1] Published with the aproval of the director of the Idaho Agricultural Experiment Station, Moscow, ID. as Paper No. 7689.

[2] M99, D-M Pharmaceuticals, Inc., Rockville, Maryland.

[3] M50-50, D-M Pharmaceuticals, Inc., Rockville, Maryland.

[4] Cap Chur Equipment, Palmer Chemical and Equipment Co., Inc., Douglasville, Maryland.

[5] Acepromazine, Ayerst Laboratories, Inc., New York, New York.

Mail correspondence to: R. A. Magonigle, Pfizer Inc., Terre Haute, Ind. 47808.

the animal assumed a recumbent position), length of immobilization, depth of immobilization, and the action of the antagonist in effecting reversal as determined by time.

RESULTS

The data are summarized in Table 1. The 8 elk utilized in the study were successfully immobilized a total of 52 times with no failures when the animal received the full projectile dosage. For our purposes, immobilization was defined as that condition in which the animal had lost muscular control, became recumbent and unresponsive to its surroundings and tactile stimuli, and could be handled without restraint. The induction time ranged from 4 to 11.4 min. On 4 occasions projectiles were deflected after initial contact with the animals and did not implant. When this occurred, 2 of the 4 elk became sedated enough to be approached but were able to regain an upright, standing position if prodded. The additional administration of 1 to 3 mg of M99 I.M. by syringe resulted in complete immobilization of these animals. The other 2 elk remained alert and required a full dosage of M99 for immobilization.

Depending on the experiment for which elk were used, the length of the immobilization period ranged from 10 to 80 min. and at no time was additional M99 required to extend the immozilization state.

In all cases, the antagonist was used to terminate the period of immobilization. Administration of M50-50 resulted in quick reversal of immobilization with the animal regaining awareness and sternal recumbency in .5 to 6 min. and arising to a standing position within a range of 1.4 to 16.7 min.

Some side effects noted were mild hyperventilation during induction and recovery and muscle twitching during onset. These signs were observed in approximately 10% of the immobilizations. Regurgitation of rumen contents occurred twice, both times in elk who had been in the recumbent state for one h. or longer. No lasting effects were observed in these two animals.

Rectal temperatures taken just prior to administration of M50-50 ranged from 37.7 to 39.2 C with a mean of 38.3 C. One bull was observed to have a body tempertaure 1 to 1.5 C higher during rut than readings taken during other times of the year.

DISCUSSION

The use of M99 in elk provided a quick, dependable means of immobilization with a wide margin of safety. In this study, the addition of acepromazine maleate was intended to counteract side effects sometimes associated with the use of M99 in wild ruminants.[3,4,7,8] Observable side effects such as hyperexcitability and hyperventilation were mild and reversal of immobilization was smooth and complete. The dosage of M99 reported here is 2.2 mg per 100 kg body weight which is similar to dosages used in other studies.[1,2,9]

One animal in the study was immobilized 11 times; however, no development of physiological tolerance or long term side effects attributable to M99 were noted. It was observed in one bull that 25% more drug was required to achieve successful immobilization during the "rut" when compared to immobilizations made during the balance of the year. This phenomena might be explained by alterations of hormone levels and metabolic activity in the male during the mating season.

The wide margin of safety observed in the use of M99 is illustrated by one occasion when 6 mg M99 was inadvertently administered I.V. instead of the antagonist to an animal already immobilized with 6 mg M99 I.M. Although further depression of the animal was seen, reversal was still complete and rapid (5 min.) when 24 mg M50-50 were administered one min. later. Adverse effects of M99 on unborn fetuses was not observed. Two pregnant elk used in these trials delivered normal calves even when immobilized within one month of parturition.

TABLE 1. The Immobilization of Elk with M99 During a 3-Year Period.

Animal	Sex	Weight kg	Number of Immobilizations	Dosage M99 (mg)	Amount of Acepromazine Administered Concurrently w/M99 (mg)	Induction		Dosage M50-50 (mg)	Reversal	
						Average Time in Minutes	Range		Average Time in Minutes	Range
1	M	364	11	7	10	6.7	6.0- 8.0	14	3.2	1.4- 4.5
2	M	*	6	6	10	5.0	4.0- 6.5	12	3.4	2.7- 4.4
3	M	*	8	6	10	5.3	4.0- 9.0	12	4.7	3.0- 7.1
4	M	320	6	6	10	6.0	4.3- 7.7	12	7.6	4.9-16.7
5	M	252	5	6	5	6.6	5.8- 7.0	12	3.6	2.1- 4.8
6	M	221	6	5	5	5.2	4.6- 7.2	10	4.0	2.0- 5.8
7	F	269	6	6	5	5.4	4.0- 7.5	12	5.0	3.0- 6.1
8	F	228	4	6	5	7.2	5.0-11.4	12	5.6	4.8- 8.2
Total	6M 2F	——	52	—	—	5.9	4.0-11.4	—	4.6	1.4-16.7

*Animals weight not determined.

The observations made on elk in this study confirm previous reports that M99 is an excellent drug for the immobilization of elk. As described by Coggins,[2] M99 has been successful in inducing immobilization under field conditions. However care would be warranted in immobilizing free roaming elk due to the range of the induction (4.0-11.0 min.) period observed. Repeated use of M99 on the same group of elk over a three year period without deleterious effect gives assurance it can be used in the field without fear of unnoticed side effects causing harm to the animals once released after trapping and sample collection.

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Received for publication 3 August 1976