A PRELIMINARY INVESTIGATION INTO THE IMMOBILISING POTENTIAL OF A TILETAMINE/ZOLAZEPAM MIXTURE, METOMIDATE, A METOMIDATE AND AZAPERONE COMBINATION AND MEDETOMIDINE IN OSTRICHES (Struthio camelus)

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ABSTRACT

Ostrich chicks (n=34) were successfully immobilised with intramuscular injections of a tiletamine/zolazepam mixture at dosages of 5, 10, 15 and 20 mg kg^{-1}; with metomidate at dosages of 15 and 20 mg kg^{-1} and with a metomidate/azaperone combination at respectively 20 and 6,6 mg kg^{-1}, and 10 and 3,3 mg kg^{-1}. Unsatisfactory immobilisation with violent body movements and self traumatisation were observed in an adult ostrich after the intramuscular administration of a tiletamine/zolezepam mixture. Anaesthesia was achieved by the administration of metomidate in combination with azaperone. Medetomidine administered at a dosage rate of 0,1 mg kg^{-1} did not result in immobilisation of ostrich chicks (n=4). Findings in ostrich chicks should not necessarily be extrapolated to adult birds.

Key words: Ostrich, *Struthio camelus,* immobilisation, tiletamine, zolazepam, metomidate, azaperone, medetomidine

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INTRODUCTION

Successful field immobilisation of free-ranging ostriches (*Struthio camelus)* by chemical means would require the intramuscular or subcutaneous administration of an immobilising agent. The intramuscular administration of drugs in ostriches has met with variable success; large dosages of drugs, and difficult induction and recovery periods being some of the recorded problems[3 4 6 7]. A tiletamine/zolezepam combination has been used either intramuscularly (4-12 mg kg^{-1}) or intravenously (2-8 mg kg^{-1}) as an induction agent[6]. Tiletamine has also been used in combination with ketamine to restrain ostriches[3]. As yet, an effective immobilising drug for intramuscular administration has not been identified.

Tiletamine hydrochloride, a cyclohexamine anaesthetic agent, in combination with zolazepam hydrochloride, a benzodiazepine tranquilliser, results in cateleptoid anaesthesia and analgesia in mammals[8]. The intramuscular administration of the drug usually results in smooth induction and recovery from anaesthesia, good skeletal muscle relaxation as well as a retention of palpebral and pharyngeal reflexes[8]. In mammals, the clinical effects of medetomidine, a potent selective and specific agonist of pre- and postsynaptic alpha 2-adrenoceptors, include sedation, anxiolysis and analgesia[5] Metomidate, an imidazole derivative, alone or in combination with azaperone, a butyrophenone tranquilliser, has been used as an immobilising agent in mammals and birds[1]. Metomidate has strong central muscle relaxant properties, but no analgesic activity and is often used in combination with azaperone. Azaperone is one of the butyrophenone tranquillisers[1].

This paper reports on an evaluation of the immobilising potential of intramuscular injections of a tiletamine/zolazepam mixture, metomidate, a metomidate/azaperone combination and medetomidine in ostriches.

MATERIALS AND METHODS

Ostrich chicks (n=39) of both sexes, ranging in body mass from 6,4 to 22,5 kg (Table 1) and one adult male ostrich were used in this investigation. These partially tame, apparently healthy birds were kept under semi-intensive conditions on a commercial ostrich farm. All birds were subjected to a single treatment each.

Prior to the administration of the test drug, the birds were manually restrained and body mass, rectal temperatures as well as heart and respiratory rates were recorded. Birds were sexed by cloacal inspection.

Birds received one of the following treatments: a tiletamine/zolazepam combination (Zoletil 50, Reading) (250 mg ml^{-1}) at 5, 10, 15 or 20 mg per kg; metomidate (Hypnodil, Janssen) (50 mg ml^{-1}) at 15 or 20 mg per kg, metomidate at 20 mg kg^{-1} in combination with azaperone (Stresnil, Janssen) (40 mg ml^{-1}) at 6,6 mg kg^{-1}, metomidate at 10 mg kg^{-1} in combination with azaperone at 3,3 mg kg^{-1} and medetomidine (Domitor, Farmos Group) (1 mg ml^{-1}) at 100 ug kg^{-1} (Table 1).

Following intramuscular administration of the drug, the birds were carefully observed. Times to immobilisation, any visible reactions to the drug and time to recovery were recorded. Rectal temperatures, pulse and respiratory rates were also recorded at regular intervals. Pedal reflexes were evaluated at the same time. Birds were regarded as immobilised when they assumed lateral or sternal recumbency. Birds were considered to have recovered from the effects of the drug when

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Table 1: **Number, sex, body mass of ostriches immobilised with either a tiletamine/zolazepam mixture, a metomidate/azaperone combination, metomidate or medetomidine. Time to immobilisation and time immobilised are also given**

Drug	n	Sex m	Sex f	Body mass (range)kg	Dosage mg kg^{-1}	Time to immobilisation ($\bar{x}$,SD)	Time immobilised ($\bar{x}$,SD)
Tiletamine/	5	4	1	6,6-10,7	5	1 min 56s (± 34s)	33 min 10s (± 9 min)
zolazepam	5	2	3	6,4-9,2	10	3 min 15s (± 2 min 19s)	79 min (± 33 min 12s)
	1		1	12,2	15	1 min 25s	106 min
	4	2	2	9,7-16,1	20	1 min 9s (± 15s)	126 min 24s (± 48 min)
	1	1		estimated 130	650*	15 min 42s	160 min
Metomidate	5	4	1	8-15,1	15	3 min 23s (± 40s)	44 min 38s (± 15 min 12s
	5	3	2	11-14,1	20	2 min 20s (± 58s)	58 min 36s (± 18 min 48s
Metomidate/	5	2	3	8,4-22,5	20/6,6	1 min 50 (± 18 min 24s)	119 min (± 18 min 54s)
asaperone	5	1	4	10,8-13,3	10/3,3	2 min 58s (± 1 min 35s)	45 min (± 9 min 48s)
Medetomidine	4	2	2	11,8-18,3	0,1	not immobilised	

*total dosage
SD = standard deviation

they were able to stand on their feet unassisted.

Time to immobilisation and time immobilised were examined by regression analysis against dosage of drug or drug combinations.

RESULTS

The body mass and sex of the ostriches as well as the average times to immobilisation and the average time the ostriches remained immobilised are presented in Table 1. Prior to the injection of test drugs, rectal temperatures, respiratory and heart rates were respectively 39,9°C (n = 39; SD = 0,54; range = 39-41,1) 25 cycles min^{-1} (n = 39; SD = 39,9 range 12-60) and 121 beats min^{-1} (n = 39; SD = 23; range 80-164). The adult male ostrich could not be examined prior to administration of the drug. Average respiratory and heart rates after the administration of the test drugs are presented in Table 2. Increased heart rates were recorded in birds treated with the tiletamine/zolezepam combination at a dosage rate of 20 mg kg^{-1}, at 15 min after the injection of metomidate at 15 mg kg^{-1}, and after the administration of metomidate (20 mg kg) and the metomidate/azaperone combinations (Table 2).

The administration of the relatively lower dosages of the metomidate/azaperone combination resulted in an average increase in cloacal temperature of 0,6°C whereas the higher dosages caused an average drop in cloacal temperature of 0,8°C after 75 min. Minimal changes in cloacal temperatures were observed with administration of the other drugs.

All birds injected with the tiletamine-/zolazepam combination, metomidate or with the metomidate/azaperone combinations were immobilised. Immobilisation was often preceded by forward and backward staggering until the birds collapsed in either sternal or lateral recumbency. Birds injected with metomidate, showed a progressive limp in the leg in which they were injected before going down. In chicks immobilised with the different dosages of the tiletamine/zolazepam combination, metomidate and with the metomidate/azaperone combination (10 and 3,3 mg kg^{-1}), intermittent kicking movements, intermittent head and neck movements, occasional yawning and, in some birds, regurgitation of a greenish fluid were observed. Body, leg and neck movements were precipitated by handling, by insertion of a thermometer into the cloacae and by testing pedal reflexes. Pedal reflexes remained intact.

The adult ostrich immobilised with the tiletamine/zolezepam mixture displayed violent kicking movements and flung its head, neck and body around. This resulted in a serious damage to both eyes of the ostrich.

The ostriches immobilised with the metomidate/azaperone imxture (20 and 6,6 mg kg^{-1}) remained very still throughout the period of immobilisation. Salivation and regurgitation were observed in 4 of the birds. Pedal reflexes disappeared and were only elicited 75-90 min after administration of the drug. Profound respiratory suppression occurred in 2 birds; one bird became completely apnoeic and in another, the respiratory rate dropped to 2 cycles per min. Rhythmic chest compression and the intravenous administration of 10 mg of doxapram hydrochloride (Dopram, Continental Ethicals) resulted in adequate ventilation of the bird. All birds made very smooth recoveries.

Droopings of the wings, mild drowsiness, occasional drooping of the head and slight ataxia were observed in the birds treated with medetomidine. The birds were not immobilised. All showed a drop in heart rate.

Increased dosages of the tiletamine/zolezepam mixture and the metomidate/azaperone combination were significantly positively correlated with time immobilised (r = 0,77; r = 0,94). The correlation between drug dosage and time to immobilisation was statistically insignificant.

DISCUSSION

Tiletamine in combination with zolazepam, metomidate and metomidate in combination with azaperone successfully immobilised ostrich chicks. Although the birds were immobilised, full anaesthesia and analgesia were apparently achieved with the metomidate/azaperone combination only. Apart from fluid regurgitation in some birds, increased heart rates with higher dosages of drugs and respiratory

Table 2: **Average respiratory and heart rates of ostrich chicks at times after the administration of different dosages of a tiletamine/zolazepam mixture, metomidate, and a metomidate/azaperone combination**

No of ostriches	Drugs and dosage rate; average respiratory and heart rates	Time in min after administration of drug						
		5	10	15	30	45	60	75
5	Tiletamine/zolazepam; 5 mg kg^{-1}							
	respiratory rate	26	22	22	21	-	-	-
	heart rate	131	117	121	102	-	-	-
5	Tiletamine/zolezepam; 10 mg kg^{-1}							
	respiratory rate	23	21	26	22	22	21	-
	heart rate	125	122	131	110	110	92	-
1	Tiletamine/zolezempam; 15 mg kg^{-1}							
	respiratory rate	26	20	20	16	16	12	-
	heart rate	132	112	120	126	100	88	-
4	Tiletamine/zolazepam; 20 mg kg^{-1}							
	respiratory rate	40	46	43	41	31	25	-
	heart rate	186	153	140	125	111	101	-
5	*Metomidate; 15 mg* kg^{-1}							
	respiratory rate	-	25	21	31	115	-	-
	heart rate	-	111	133	108	115	-	-
5	Metomidate; 20 mg kg^{-1}							
	respiratory rate	-	33	20	43	56	-	-
	heart rate	-	166	166	147	130	-	-
5	Metomidate/azaperone; 10 and 3,3 mg kg^{-1}							
	respiratory rate	17	14	16	16	18	-	-
	heart rate	184	186	171	144	126	-	-
5	Metomidate/azaperone; 20 and 6,6 mg kg^{-1}							
	respiratory rate	16	24	19	21	28	24	16
	heart rate	193	196	192	179	185	160	145

- respiratory and heart rate not taken

suppression in 2 birds, no other untoward clinical side-effects were observed in these ostrich chicks.

The tiletamine/zolezepam combination, however, resulted in unsatisfactory immobilisation (associated with serious self-traumatisation) of the adult ostrich and should thus possibly not be used for immobilisation of free-ranging ostriches. This should also caution against the extrapolation of our relatively favourable findings in chicks to mature ostriches.

The metomidate/azaperone mixture resulted in smooth induction, maintenance and recovery from the immobilised state. Birds appeared to have been fully anaesthetised. A dosage of approximately 15 mg kg^{-1} metodomidate and 4 mg kg^{-1} azaperone should be considered for the immobilisation of ostriches in the field. Further investigation into the use of this drug combination under field conditions, should be undertaken.

The administration of medetomidine did not result in immobilisation of ostrich chicks. Medetomidine, primarily an anxiolytic drug, should therefore probably be used in combination with other immobilising agents such as ketamine hydrochloride. This would be in agreement with its reported use in other species[2].

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REFERENCES

1. Hall L W, Clarke K W 1983 Veterinary anaesthesia (8th edn). Bailliere Tindall, East Sussex, pp 417
2. Jalanka H 1989 The use of medetomidine, medetomidine-ketamine combinations and atipamezole at Helsinki Zoo-a review of 240 cases. Acta Veterinaria Scandinavica 85: 193-197
3. Jensen J 1989 Husbandry, medical and surgical management of ratites. Part I. Proceedings of the American Association of Zoo Veterinarians: 113-118
4. Samour J H, Irwin-Davies J, Faraj E 1990 Chemical immobilization in ostriches *(Struthio camelus)* using etorphine hydrochloride. The Veterinary Record 127: 575-576
5. Savola J M, Ruskoaho H, Puurunen J, Salonen J S, Karki N T 1986 Evidence for medetomidine as a selective and potent agonist at alpha 2-adrenoceptors. Journal of Autonomic Pharmacology 5: 275-284
6. Stewart J S 1989 Husbandry, medical and sur-

gical management of ratites. Part II. Proceedings of the American Association of Zoo Veterinarians: 119-112
7. Stoskopf M J, Beall F B, Ensley P K, Neely E 1982 Immobilization of large ratites: Blue necked ostrich (*Struthio camelus austrealis)* and Double wattled cassowary *(Casuarius casuarius)* with haematologic and serum chemistry data. Journal of Zoo Animal Medicine 13: 160-168
8. Van Heerden J, Burroughs R E J, Dauth J, Dreyer M J 1991 Immobilization of wild dogs with a tiletamine hydrochloride/zolazepam combination and subsequent evaluation of selected blood chemistry parameters. Journal of Wildlife Diseases 27:xx-xx