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Tolazoline: effect on xylazine-ketamine-induced anesthesia in Turkey vultures

Effect of tolazoline on xylazine-ketamine-induced anesthesia in turkey vultures

Jack L. Allen, DVM, and James E. Oosterhuis, DVM

SUMMARY

Fifteen turkey vultures were each given xylazine (1 mg/kg of body weight, IM) and ketamine (10 mg/kg, IM). In 5 of the birds (controls), the mean (\pm SD) induction time was 5.4 ± 1.0 minutes and the mean duration of anesthesia was 109.8 ± 25.4 minutes. The remaining 10 vultures (test birds) were given tolazoline (15 mg/kg, IV) 45 minutes after administration of xylazine and ketamine. In the test birds, the mean induction time was 4.5 ± 1.6 minutes and the mean duration of anesthesia was 49 ± 2.1 minutes. After administration of tolazoline, the birds regained consciousness in 3.7 ± 1.9 minutes and were standing with normal posture in 14.2 ± 5.4 minutes. All birds remained moderately sedated yet ambulatory and responsive to stimuli for 30 to 60 minutes after tolazoline administration. Results indicated that tolazoline was useful in controlling the duration of xylazine-ketamine-induced anesthesia in turkey vultures.

IN AVIAN MEDICINE, xylazine or xylazine-ketamine combinations have been used for restraint and anesthesia for various species.¹⁻³ Alpha-adrenergic blockers can be used as antagonists for xylazine-induced or xylazine-ketamine-induced immobilizations in various mammals.⁴⁻¹⁰ Anesthetic antagonists promote rapid awakening and ambulation and prevent prolonged recovery periods with associated risks (eg, recumbency neuropathy and myopathy).

Tolazoline (an α -receptor antagonist¹¹) can block xylazine-induced CNS depression in cattle,¹² sheep,¹³ mice,¹⁴ and chickens¹⁴ and can reverse xylazine-ketamine-induced immobilization in African elephants.¹⁵

The purpose of the present study was to evaluate the use of tolazoline as an antagonist for xylazine-ketamine-induced anesthesia in turkey vultures (*Cathartes aura*).

Materials and Methods

Fifteen healthy mature turkey vultures (1.7 to 2.1 kg) were used. All birds had been free-ranging and had been captured recently. They were maintained in a 13 by 13-m outdoor chain-link enclosure during the study. Their diet in captivity consisted of mice, day-old chicks, and commercial raptor food.^a Food was withheld from all birds 24 hours before induction of anesthesia. Each bird was restrained manually, weighed, and injected with xylazine^b (1 mg/kg) and ketamine^c (10 mg/kg), in different syringes, into the pectoral muscles. After injection, the birds were released into a smaller pen (1.5 m by 2 m) and left undisturbed until recumbent.

Five of the birds were used as controls and were placed in dorsal recumbency, without further treatment. The remaining 10 birds (treated birds) were placed in dorsal recumbency and were given tolazoline^d (15 mg/kg, IV) 45 minutes after administration of xylazine and ketamine. Cloacal temperature, heart rate, and respiratory rate were monitored and were recorded every 10 minutes. The following observations were evaluated: induction time (the time required from injection of the xylazine and ketamine until onset of recumbency), duration of anesthesia (the time required from the onset of recumbency until the bird rolled from dorsal to ventral recumbency and assumed a crouched position), time for return to consciousness after tolazoline administration (the time required from tolazoline injection until the bird rolled from dorsal to ventral recumbency and assumed a crouched position), and the time to stand after tolazoline administration (the time required from return to consciousness until the bird assumed an upright stance with normal wing posture).

Differences between the mean values for induction time and duration of anesthesia of the control birds and for the tolazoline-treated birds were assessed by use of the unpaired *t* test.

Results

Administration of xylazine and ketamine to turkey vultures rapidly induced a consistent level of anesthesia. Muscle relaxation was good during anesthesia. A significant difference in mean induction time between the control and treated birds was not found. The mean (range) cloacal temperature, heart rate, and respiratory rate of the 15 birds (combined mean and range) during the period of anesthesia

^aBird of Prey Diet, Nebraska Brand, North Platte, Neb.

^bRompun, Cutter Laboratories, Shawnee, Kan.

^cKetaset, Bristol Laboratories, Syracuse, NY.

^dPriscoline, CIBA Pharmaceutical Co, Summit, NJ.

From the Department of Veterinary Services, San Diego Wild Animal Park, 15500 San Pasqual Valley Rd, Escondido, CA 92027.

were 38.8 (37.2 to 40.0) C, 77 (62 to 95) beats/min, and 35 (14 to 57) breaths/min, respectively. The mean duration of anesthesia for the test birds was 49 ± 2.1 minutes, as compared with 109.8 ± 25.4 minutes for the controls. Injection of tolazoline reduced significantly ($P < 0.05$, unpaired t test) the duration of anesthesia. The mean time for return to consciousness was 3.7 ± 1.9 minutes, and the mean time required for standing upright after tolazoline administration was 14.2 ± 5.4 minutes. During the recovery from anesthesia, the birds were moderately ataxic and were in a crouched position, with both wings widely extended for balance. With time, the birds made more frequent attempts to walk until a slow gait with an upright, normal wing posture was attained. A dulled mentation was apparent. Relapses to unconsciousness were not observed. All treated birds remained moderately sedated, ambulatory, and responsive to stimuli for 30 to 60 minutes after tolazoline administration.

Discussion

In the present study, administration of xylazine and ketamine was an effective anesthetic combination in turkey vultures. A consistent uniform response to the combination was observed. Because the birds were not physically stimulated during their period of anesthesia, conclusions as to the suitability for surgical procedures cannot be made. Administration of tolazoline resulted in rapid arousal and return to mobility after xylazine-ketamine-induced anesthesia in turkey vultures. Although the birds regained consciousness and were ambulatory after tolazoline administration, the birds remained moderately sedated for 30 to 60 minutes, after which the birds were able to fly short distances. Therefore, after this anesthesia and tolazoline-induced arousal, turkey vultures should be kept isolated and under observation for at least 60 minutes before being released into a large enclosure or into a flock of other birds.

Although inhalation anesthetic agents generally are preferred over parenterally administered anes-

thetic agents because they provide better anesthetic control and a more rapid recovery from anesthesia, veterinarians and wildlife biologists performing avian field research often must rely on parenterally administered anesthetic agents. Therefore, tolazoline may be a useful antagonist for xylazine-ketamine-induced anesthesia in avian species.

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