Reprinted from the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION,
Vol. 169, No. 9, Pages: 884–885

Immobilization of Giraffes with Xylazine and Etorphine Hydrochloride

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ETORPHINE[a] has been the drug most commonly used for immobilization of giraffes, according to several reports.[1-4] The present report is concerned with the use of xylazine[b] alone, and in combination with etorphine, in the masai and reticulated giraffe *(Giraffa camelopardalis)*.

Preimmobilization Precautions

The giraffe should be fasted 48 to 72 hours, and water should be withheld the final 24 hours to minimize the possibility of regurgitation. It is desirable that the giraffe be in an enclosure with sound footing and walls or fencing equal to the giraffe's height.

Unsuitable Response Using Xylazine Alone

We have found that giraffes are extremely sensitive to xylazine and that its use alone does not permit safe manipulative procedures, as cited in the following 2 cases:

Case 1—To facilitate examination, a 3-year-old female reticulated giraffe was given 100 mg of xylazine intramuscularly, by use of a pole syringe. Within 4 minutes the giraffe was sedated, with its head lowered and tongue protruding. Salivation was minimal. Ataxia was marked during the next 30 minutes, precluding any handling attempts. After 32 minutes the giraffe collapsed to sternal recumbency, but with its head erect and aware of its surroundings. Five minutes later the giraffe arose carefully. Ataxia continued an additional 18 minutes. Ninety minutes after initial injection, handling was attempted but the giraffe would not allow manipulation for tuberculin testing or collection of a blood sample. The giraffe was normal 2 hours after injection.

Case 2—An excitable, 13-month-old female masai giraffe was given 20 mg of xylazine intramuscularly, by use of a pole syringe. After 10 minutes, ataxia, mild salivation, and protrusion of the tongue were noticed. When the giraffe was approached, it attempted to escape but was unsteady on its feet and stumbled several times. Because it was feared the giraffe would injure itself, attempts at crating were discontinued. The giraffe was normal 90 minutes after the injection of xylazine.

Satisfactory Combinations of Xylazine and Etorphine

The following examples demonstrate the use of xylazine in combination with etorphine to produce desirable restraint or immobilization:

Case 3—A 2-year-old female masai giraffe was immobilized for examination and surgical repair of a mandibular fracture. Initial medication consisted of xylazine (250 mg) mixed with atropine sulfate (10 mg), given intramuscularly. Eighteen minutes after xylazine was given, etorphine (1.5 mg) was given by hand syringe, intramuscularly. After 4 minutes the giraffe was assisted down. Manual restraint was initially required to prevent the giraffe from attempting to stand. Excellent relaxation was achieved and surgical repair of the fracture was completed. At 60 minutes after onset of restraint, diprenorphine[c] (4 mg) was given in combination with doxapram hydrochloride[d] (140 mg), intravenously. Two minutes later the giraffe was standing, although it was ataxic. At 1 hour after injection of diprenorphine and doxapram hydrochloride, the giraffe became increasingly ataxic. An additional 100 mg of doxapram hydrochloride was given intramuscularly and coordination improved considerably within 15 minutes. Ataxia returned after 60 minutes. Another intramuscular dose of doxapram hydrochloride (100 mg) improved the giraffe's coordination and it recovered without complications.

A 2nd immobilization of the giraffe was necessary to remove the intramedullary pins placed 4 weeks previously to repair the fracture. The dose of xylazine was reduced to 200 mg and was given with atropine sulfate (10 mg), intramuscularly. The giraffe became ataxic in 5 minutes and stumbled after 19 minutes. At this point, etorphine (1.5 mg) was given subcutaneously. Within 8 minutes the giraffe stood quietly, allowing removal of the intramedullary pins. At 16 minutes after injection of the etorphine, the giraffe laid down but quickly arose, then was manually restrained when it laid down a 2nd time.

Three loose incisors were extracted during the 15 minutes of restraint. The giraffe was given diprenorphine (4 mg) intravenously and doxapram hydrochloride (200 mg), intramuscularly. Increased depth and frequency of respiration were observed at 6 minutes and the giraffe stood at 7 minutes. As in the previous immobilization, 2 additional intramuscular injections of doxapram

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[a] M-99, D-M Pharmaceuticals, Inc, Rockville, Md.

[b] Rompun, Baychem Corporation, Kansas City, Mo.

[c] M50-50, D-M Pharmaceuticals, Inc, Rockville, Md.

[d] Dopram-V, A. H. Robins Company, Richmond, Va.

hydrochloride were administered when stumbling and ataxia became marked. Each time, coordination improved within 15 minutes.

Case 4—A 3-year-old male reticulated giraffe required hoof trimming and was given xylazine (60 mg), intramuscularly. Eighteen minutes later ataxia, salivation, and tongue protrusion were noticed. At this time, etorphine (1.5 mg) was given. The giraffe became progressively ataxic but not recumbent. An additional intramuscular injection of etorphine (0.5 mg) was given 18 minutes after the first injection of etorphine. The giraffe became recumbent 10 minutes later. After a 41-minute hoof-trimming procedure, diprenorphine (4 mg) was given intravenously. Two minutes later, the giraffe attempted but failed to stand. After another 2 minutes, the giraffe was able to stand with minimal assistance.

This giraffe was immobilized on 2 subsequent occasions for repeated hoof trimming. In an attempt to eliminate the additional doses of etorphine given in the 1st trial and to obtain a shorter induction period, the dosages of both drugs were increased (75 mg of xylazine followed in 20 minutes by 3 mg of etorphine). As the giraffe became sedated, it was haltered to facilitate control of its head as it became recumbent, which occurred approximately 10 minutes after the injection of etorphine. On both occasions, the hoof-trimming procedures required 40 minutes and, 4 minutes after administration of antagonist, the giraffe regained its feet, with good coordination.

Case 5—The same sequence of drug administration as described for case 4 was used to crate an excitable 13-month-old female masai giraffe (case 2). Twenty-four minutes after the giraffe was given xylazine (25 mg) intramuscularly, ataxia and minor depression were evident. At this time, etorphine (0.8 mg) was given intramuscularly; 20 minutes later, the giraffe was oblivious to its surroundings and was assisted into the crate. Diprenorphine (2 mg) was given intramuscularly 30 minutes after the injection of etorphine; 10 minutes later, the giraffe laid down, with its head erect. During the next 30 minutes it made several unsuccessful attempts to regain its feet and, thus, had to be assisted to stand. During the 24 hours in transit, the giraffe remained calm and laid down on several occasions. It arrived in good condition.

Case 6—The same procedure was used on another highly excitable 1-year-old female masai giraffe. It was given xylazine (20 mg) intramuscularly. After 5 minutes, it was assisted into the crate. It was given diprenorphine (2 mg) intramuscularly, 28 minutes after the etorphine was given. The giraffe laid down in the crate 3 minutes later, with its head held erect. Following 2 unsuccessful attempts at rising, it regained its feet after being down for 15 minutes. The giraffe made a 1,000-mile trip by truck without incidence and arrived in good condition.

Discussion

Giraffes given xylazine only appeared sedated but easily became aroused by any manipulative attempts. Their defensive responses (kicking and flight) remained intact, although uncoordinated in execution. These circumstances precluded any handling.

When complete immobilization was necessary, xylazine and etorphine were used in combination. The dosages for the 2 immobilizations of giraffe 3 were adequate for the surgical procedure but prolonged ataxia was encountered during the postimmobilization period. The use of doxapram hydrochloride partially alleviated the ataxia and appeared to effect an arousal response. Subsequent immobilization episodes in giraffe 4 demonstrated that the desirable calming effects of xylazine could be achieved with lower dosages, which also eliminated the postimmobilization ataxia.

Etorphine and xylazine in combination afford the immobilization necessary for major procedures. At lower dosages, the combination of drugs has a narcotizing effect, allowing manipulative procedures such as crating, collection of blood samples, and tuberculin testing. Following the crating procedure (cases 5 and 6), the antagonist was given intramuscularly to facilitate slower emergence from the effects of etorphine. In both of these cases, the giraffes became recumbent but we believe this would have happened without the antagonist. The recumbency may have been averted if the antagonist had been given intravenously or if the dose of etorphine had been lower.

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