Effect of Alfaxalone in Raptors: Pilot Study in Common Kestrels (Falco tinnunculus)

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Abstract

Alfalone has been re-formulated and currently holds some very few studies in avian species using this new formulation. The aim of this pilot study is to describe cardiorespiratory effects and the degree of sedation of alfalone administered intramuscularly in common kestrels (Falco tinnunculus).

Adult male and female common kestrels hospitalized and considered non-releasable were anaesthetized with alfalone (Alfaxan®) using 2.5, 5, 10 and 20 mg/kg body weight, using a non-invasive arterial blood pressure and temperature were monitored. Time from drug administration until the first signs of ataxia and total sedation time were noted. Degree of sedation and quality of recovery were assessed using different scales.

There were no complications from anaesthesia and recovery. First signs of sedation (ataxia) appeared within 2 min of administration. Degree of sedation and duration of anaesthesia (from 10 to 35 min) was dose dependent. Cardiorespiratory depression was observed with all doses and was dose dependent.

Introduction and Objective

Alfalone is a steroidal anaesthetic agent, highly water-insoluble and historically was formulated in combination with alphadalone and Cremophor®-EL, a solvent that has been associated with adverse reactions in dogs and cats, hypersensitivity reactions related to the diluent Cremophor-EL led the withdrawal of Althesin® (Glaxo) and Safanat® (Shering Plough Animal Health) (Muir et al. 2008; Prys-Roberts and Sear, 1975).

The current study describes the efficacy for use in birds in the 70’s (Copper and Frank, 1973 and 1974). Fatal complications and electrocardiographic changes with alfalone were previously described in birds (Copper and Redg, 1975; Frank and Cooper, 1976; Cribb and Haigh, 1977), but this anaesthetic was used successfully in the 80’s. Alfalone has been re-formulated (Figure 1) and marketed in Europe in 2009 (Alfaxan®, Vetqetinol) in combination with 2-hydroxypropyl-beta-cyclodextrin (HPD) increasing the solubility and making possible to use intramuscular doses in birds. However, little information in avian species reporting this new formulation is available and the suitable intramuscular doses are sparse.

The aim of this clinical pilot study is to explore and describe cardiorespiratory effects and the degree of sedation of clinical doses of a new formulation of alfalone to better define a suitable intramuscular dose in common kestrels (Falco tinnunculus).

Material and Methods

After obtaining the approval of the Institutional Animal Care and Use Committee (GREFEA IACUC, Wildlife Hospital and Rehabilitation Center, Majadahonda-Madrid, Spain), two adult male and four female common kestrels (Falco tinnunculus), all of the same age (10 months) and sex (nine males and 19 females) were included in the study. All animals were considered non-releasable, were anaesthetized with alfalone (Alfaxan®) using 2.5, 5, 10 and 20 mg/kg administered intramuscularly. Clinical doses administered in this study were selected from the clinical dose range reported previously in birds (Samour et al. 1984; Hartman and Brown, 1979) and confirmed from the sparse information provided by Vetqetinol.

Heart rate and respiratory rate, temperature and non-invasive arterial blood pressure were monitored (Figure 2). Time from drug administration to the first signs of ataxia and total sedation time were noted. Degree of sedation and quality of recovery were assessed using different scales. Tracheal intubation was attempted to evaluate the response to the stimulus. The time from administration of alfalone was recorded. Each animal was anaesthetized four times. Each dose was administered by at least one-well-trained researcher.

Table 3. Time of loss of standing position

<table>
<thead>
<tr>
<th>Dose (mg/kg)</th>
<th>M</th>
<th>N</th>
<th>Mean (SD)</th>
</tr>
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<tbody>
<tr>
<td>2.5</td>
<td>4</td>
<td>3</td>
<td>190 (27.8)</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>190 (27.8)</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>3</td>
<td>190 (27.8)</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>3</td>
<td>190 (27.8)</td>
</tr>
</tbody>
</table>

Numbered variables were analyzed using analysis of variance. A one-way analysis of variance (ANOVA) for repeated measures (dose x time) was performed with the intra-subject factor being the time and the inter-subject factor being the drug. The Bonferroni test was used to compare dose-groups. A p value of <0.05 was set to indicate statistical significance. Categorical data were analyzed using nonparametric procedures. All analyses and graphs were performed using the GraphPad Prism 4 (GraphPad Software, Inc. USA).

Results

Four kestrels were anaesthetized four times with the described doses. Two kestrels were only anaesthetized 3 times at different doses (Table 1). A total number of 22 anaesthetic procedures were performed (Table 2). Most of the animals did not show any complications during anaesthetic maintenance and recovery. However, unfortunately two kestrels could not complete the four doses scheduled. One of the female kestrels (W0626) died after being anaesthetized without any problem at 10 mg/kg during recovery. Necropsy was not performed and could not explain this fatal complication. One male kestrel was euthanized because of the worsening of its injuries and the appearance of pain. Minor complications recorded in this pilot study were: drooling, tremors and loss of ataxia (after administration of 2.5, 5, 10 and 20 mg/kg) and 60 min after the administration of 20 mg/kg. This animal was given 10 mg/kg clavamox® and was discharged from the hospital.

Cardiorespiratory depression was observed with all doses but did not significantly differ were observed between dosages (Figure 4-5). Non-invasive arterial blood pressure could not be monitored accurately because an inappropriate level of anaesthesia at 2.5, 5 and 10 mg/kg doses. Significant changes in temperature were not observed (Figure 7). Tracheal intubation was only successful when 20 mg/kg dose was administered (Table 4).

Discussion and Conclusions

In this pilot study alfalone (Alfaxan®, Vetqetinol) did not produce adequate level of anesthesia and sedation when 2.5 and 5 mg/kg doses were administered. Short length of action was found at 10 mg/kg. However, short diagnostic procedures could be performed at doses 10 and 20 mg/kg. Recovery period was short at each dose and was not different from one dose to the other in this study (Table 4).

In conclusion, alfalone (Alfaxan®, Vetqetinol) produced dose dependent cardiorespiratory depression and sedation in common kestrels. Intubation was not easily performed, being only successful when the highest dose was administered.

Alfalone has been used in avian practice for over 40 years, but there are few published reports for dose guidelines for individual species (Samour et al. 1984; Bailey et al. 1999).

Preliminary report by Brown and Hartman (1979) on some common kestrels (Falco tinnunculus) at doses ranging 34-38 mg/kg, induction and recovery times were not described. In a study on the anesthetic in California quail (Brown, 1979), alfalone produced moderate sedation within 2 to 3 minutes after the injection of 20 mg/kg body weight in the first stage of anesthesia. (Harcourt-Brown, 1978; Gandin et al. 1986; Cullen et al. 1995).

In conclusion, alfalone (Alfaxan®) produced dose dependant cardiorespiratory depression and sedation in common kestrels, but only short not-painful procedures at doses of 10 and 20 mg/kg administered intramuscularly could be performed.