Veterinary
Anaesthesia and Analgesia
Formerly the Journal of Veterinary Anaesthesia

Veterinary Anaesthesia and Analgesia, 2016, **43**, 424–428 doi:10.1111/vaa.12340

SHORT COMMUNICATION

Evaluation of the influence of atipamezole on the postoperative analgesic effect of buprenorphine in cats undergoing a surgical ovariohysterectomy

Leon N Warne, Thierry Beths, Jennifer E Carter, Ted Whittem & Sébastien H Bauquier
Translational Research and Clinical Trials (TRACTs) Group, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Werribee, Vic., Australia

Correspondence: Sébastien H Bauquier, Translational Research and Clinical Trials (TRACTs), Veterinary Hospital, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Werribee, Vic. 3030, Australia. E-mail: bauquier@unimelb.edu.au

Abstract

Objective To evaluate the influence of atipamezole on postoperative pain scores in cats.

Study design Controlled, randomized, masked clinical trial.

Animals Twelve healthy female domestic cats.

Methods Cats admitted for ovariohysterectomy (OVH) surgery were randomly allocated to group atipamezole ($n = 6$) or group saline ($n = 6$) and were premedicated with buprenorphine 20 μg kg^{-1} intramuscularly (IM) and alfaxalone 3.0 mg kg^{-1} subcutaneously (SC). Anaesthesia was induced with alfaxalone intravenously (IV) to effect and maintained with isoflurane in oxygen. Ten minutes after extubation, cats from group atipamezole received IM atipamezole (0.0375 mg kg^{-1}) whereas group saline received an equivalent volume [0.0075 mL kg^{-1} (0.003 mL kg^{-1} IM)] of 0.9% saline. A validated multidimensional composite scale was used to assess pain prior to premedication and postoperatively (20 minutes after extubation). If postoperative pain scores dictated, rescue analgesia consisting of buprenorphine and meloxicam were administered. Pain score comparisons were made between the two groups using a Mann–Whitney exact test. Results are reported as the median and range.

Results Preoperatively, all cats scored 0. At the postoperative pain evaluation, the pain scores from group atipamezole [16 (range, 12–20)] were not significantly different from group saline [18 (range, 15–23)] ($p = 0.28$). All cats required rescue analgesia post-operatively.

Conclusions and clinical relevance Atipamezole (0.0375 mg kg^{-1} IM) administration did not significantly affect the postoperative pain scores in cats after OVH. Preoperative administration of buprenorphine (20 μg kg^{-1} IM) did not provide adequate postoperative analgesia for feline OVH.

Keywords analgesia, atipamezole, buprenorphine, cats, ovariohysterectomy, pain.

Introduction

In a recent study, cats undergoing an ovariohysterectomy (OVH) were premedicated with intramuscular (IM) buprenorphine (20 μg kg^{-1}) and medetomidine (15 μg kg^{-1}) and atipamezole was administered postoperatively (Warne et al. 2014). The dose of buprenorphine used was higher than ones described previously (10–20 μg kg^{-1} IM every 8–12 hours) (Branson & Gross 2001) and unexpectedly, elevated postoperative pain scores were found. Although studies have failed to demonstrate atipamezole's affinity for opioid receptors (μ, κ or δ),

the potential contribution of atipamezole to elevated postoperative pain scores has been speculated (Pertovaara et al. 2005; Warne et al. 2014).

The purpose of the present study was to evaluate the potential influence of atipamezole on the aforementioned findings of Warne et al. 2014, by re-evaluating the same regime of buprenorphine administration while eliminating medetomidine as a premedicant. We hypothesized that in cats premedicated with buprenorphine and alfaxalone, atipamezole administration after OVH surgery would result in higher postoperative pain scores than saline administration.

Materials and methods

This randomized, negative, controlled, masked clinical trial was approved by the animal ethics committee of the University of Melbourne. Domesticated female cats of less than 4 years of age that were admitted to the University Veterinary Hospital for an elective OVH were included in the trial. Cats were determined to be healthy by means of physical examination and basic blood analysis and were randomly allocated to group atipamezole (n = 20) or group saline (n = 20) using Excel 2011 (Microsoft Corporation, WA, USA) by SHB.

Cats were premedicated with buprenorphine 20 μg kg^{-1} (Ilium Buprenorphine Injection 10 mg mL^{-1}; Troy Laboratories Australia Pty Ltd, Australia) IM in the quadriceps muscle and alfaxalone-HPCD 3.0 mg kg^{-1} (Alfaxan 10 mg mL^{-1}; Jurox Pty Ltd, Australia) subcutaneously (SC) between the two scapulae. Twenty minutes later, a 22-gauge catheter was placed in one of the cephalic veins. Anaesthesia induction commenced 30 minutes after premedication using alfaxalone administered intravenously (IV) to effect (range, 1–7 mg kg^{-1}) until orotracheal intubation was achieved. The endotracheal tube was then connected to a paediatric rebreathing system and isoflurane (Isorrane; Baxter Healthcare Pty Ltd, Australia) in oxygen (1–2 L $minute^{-1}$) was administered to effect to maintain anaesthesia. Every 5 minutes, the depth of anaesthesia was assessed by noting clinical signs. A balanced crystalloid solution (Hartmann's Solution for Injection; Fresenius Kabi Pty Ltd, Australia) was administered IV at a rate of 10 mL kg^{-1} $hour^{-1}$ during anaesthesia.

A multi-parametric anaesthesia monitor was used to monitor electrocardiogram, heart rate (HR), respiratory rate (f_R), the partial pressure of end-tidal carbon dioxide ($PE'CO_2$), and oxygen haemoglobin saturation [by pulse oximetry (SpO_2)]. The mean arterial blood pressure (MAP) was obtained via a noninvasive oscillometric blood pressure device (petMAP Ramsey Medical Inc., USA) placed above the metacarpus.

Surgery was performed by experienced surgeons according to the surgical standards of the institution (midline approach). Anaesthesia time was defined as the time from the start of anaesthetic induction to the time of extubation, and surgery time was defined as the time from the primary skin incision to the placement of the last skin suture. Ten minutes after extubation, cats received either atipamezole 0.0375 mg kg^{-1} IM (Antisedan 5 mg mL^{-1}; Pfizer Animal Health, Australia) or an equivalent volume [0.0075 mL kg^{-1} (0.003 mL kg^{-1}), IM] of 0.9% saline (0.9% Sodium Chloride Intravenous Infusion; Baxter Healthcare Pty Ltd). The insulin syringe and needle (0.3 mL, 29 gauge, 12.7 mm) containing atipamezole or saline was prepared by SHB or JEC and was labelled only with the individual cat's study number.

Pain assessments (including systolic arterial blood pressure measurements) were conducted using a validated multidimensional composite pain scoring system (range 0–30; 0 being no detectable pain and 30 representing extreme pain) (Brondani et al. 2013, http://www.animalpain.com.br/assets/upload/escala-en-us.pdf). The *preoperative score* was the baseline pain evaluation score determined before premedication. The *postoperative pain score* was the evaluation score at each time point (20, 60, 120, 240 and 360 minutes post extubation). The *post rescue pain score* was the postoperative pain score at 20 minutes after administration of rescue medication.

If at any time point the evaluation score was greater than 7 out of 30, the patient was determined to be in moderate to severe pain and was given rescue analgesia [buprenorphine 20 μg kg^{-1} IV and meloxicam 0.2 mg kg^{-1} SC (Metacam 5 mg mL^{-1}; Boehringer Ingelheim Pty Ltd, Australia)]. All cats were assessed for pain by the same trained anaesthetist (LNW) who was unaware of the treatment cats received. The presence of bradycardia (HR <95 bpm), hypotension (MAP <60 mmHg) or hypoxaemia (SpO_2 <95%) during anaesthesia was reported.

Data analysis was performed by use of the commercially available software package (IBM SPSS Statistics, version 20; International Business