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SHORT COMMUNICATION

Alfaxalone in cyclodextrin for induction and maintenance of anaesthesia in ponies undergoing field castration

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Abstract

Objective To evaluate the induction and maintenance of anaesthesia using alfaxalone following pre-anaesthetic medication with romifidine and butorphanol in ponies undergoing castration in the field.

Study design Prospective clinical study.

Animals Seventeen male ponies weighing 169 ± 29 kg.

Methods The ponies were sedated with romifidine and butorphanol intravenously (IV). Induction time was recorded following administration of alfaxalone 1 mg kg^{-1} and diazepam 0.02 mg kg^{-1} IV. If movement during surgery occurred, alfaxalone 0.2 mg kg^{-1} was administered IV. The quality of anaesthetic induction, and recovery were scored on a subjective scale of 1 (good) to 5 (poor). The number of attempts to attain sternal recumbency and standing, quality of recovery and times from induction to end of surgery, first head lift, sternal recumbency and standing were recorded.

Results Induction quality was good [median score (range) 1 (1–3)] with a mean ± SD time of 29 ± 6 seconds taken to achieve lateral recumbency. Ten ponies required incremental doses of alfaxalone during surgery. Mean times to the end of surgery, first head lift, sternal recumbency and standing were 26 ± 9 minutes, 31 ± 9 minutes, 33 ± 9 minutes and 34 ± 9 minutes respectively. The number of attempts to attain sternal recumbency was 1(1–1) and to attain standing was 1(1–2). Quality of recovery was good, with a recovery score of 1(1–2).

Conclusions and clinical relevance Alfaxalone provided smooth induction and recovery characteristics and was considered suitable for maintenance of anaesthesia for castration in ponies.

Keywords alfaxalone, anaesthesia, castration, ponies.

Introduction

Alfaxalone in 2-hydroxypropyl beta cyclodextrin is a neurosteroid anaesthetic agent licensed in the United Kingdom for the induction of anaesthesia in dogs and cats. Alfaxalone produces hypnosis and muscle relaxation due to enhanced effect of gamma-aminobutyric acid (GABA) on the $GABA_A$ receptor. Alfaxalone in cyclodextrin has been developed to prevent the histamine release associated with the previously available preparation solubilised in Cremaphor EL. This earlier preparation has been used for induction and maintenance of anaesthesia in experimental horses and ponies without pre-anaesthetic medication (Eales 1976). No advantages over other anaesthetic agents available at that time were evident and muscle relaxation was poor.

Excellent induction, maintenance and recovery characteristics, together with good muscle relaxation are seen in dogs following induction of anaesthesia with alfaxalone (Muir et al. 2004). Experimental studies in horses demonstrated good induction and recovery characteristics with alfaxalone 1 mg kg^{-1} following acepromazine 0.03 mg kg^{-1}, xylazine 0.5 mg kg^{-1} and guaiphenesin 35 mg kg^{-1} administered by intravenous (IV) injection (Goodwin et al. 2006). This combination resulted in a mean ± SD anaesthetic duration of 29.2 ± 4.3 minutes although surgery was not performed. In another study, again following the use of xylazine and guaiphenesin, Pearson et al. (2006) compared induction of anaesthesia with IV alfaxalone (1 mg kg^{-1}) with that following IV ketamine (2.2 mg kg^{-1}). They found induction to be comparable following both agents, and although some forelimb rigidity and tremors were seen, these occurred in both groups. Heart rate and arterial blood pressure also were similar in both groups although there was greater respiratory depression with alfaxalone. The times to achieve sternal recumbency and standing were similar although horses receiving alfaxalone took longer to achieve minimal ataxia once standing.

Romifidine is an alpha-2 adrenoceptor agonist commonly used for pre-anaesthetic medication in horses. Combination with butorphanol provides more profound sedation and may provide additional analgesia. Both agents are used commonly prior to induction of anaesthesia for surgery under field conditions. Anaesthesia often is maintained intravenously in this setting. Alfaxalone is cleared rapidly from plasma in horses, and this may make the drug suitable for maintenance of anaesthesia by incremental dosing or continuous infusion (Goodwin et al. 2006).

The objective of the study was to evaluate the induction and maintenance of anaesthesia with alfaxalone following pre-anaesthetic medication with romifidine and butorphanol in ponies undergoing field castration.

Materials and methods

The study received internal ethical approval. Seventeen poorly handled 15-month-old ponies, mean weight 169 ± 29 kg, were to undergo castration under field conditions. The ponies were sedated with romifidine (Sedivet, Boerhinger Ingelheim, Bracknell, Berkshire, UK) 100 μg kg^{-1} and butorphanol (Torbugesic, Fort Dodge Animal Health Ltd, Southampton, Hampshire, UK) 50 μg kg^{-1} administered by intravenous injection. A 14 gauge catheter was placed into the left jugular vein following subcutaneous injection of mepivacaine (Intra-Epicaine, Dechra Veterinary Products, Shrewsbury, Shropshire, UK). Approximately 10 minutes later, sedation and the response to tactile stimulation were scored using a subjective ordinal scoring system (1–4 with 1 representing optimal sedation) (Table 1). The response to tactile stimulation was assessed by palpating the testicles. If sedation was deemed inadequate by the assessor immediately prior to the induction of anaesthesia, romifidine 30 μg kg^{-1} was administered intravenously (IV). Pulse rate (PR), measured by manual palpation of the facial artery, and respiratory rate (f_R) were recorded immediately prior to induction of anaesthesia. PR and f_R were not recorded prior to sedation due to the temperament of the ponies. Diazepam (Diazepam Injection, Hameln Pharmaceuticals Ltd, Gloucester, Gloucestershire, UK) 0.02 mg kg^{-1} combined with alfaxalone (Alfaxan®, Vétoquinol UK Ltd, Buckingham, Buckinghamshire, UK) 1 mg kg^{-1} were administered IV and the induction quality was scored (1–5 with 1 representing the optimal induction) (Table 1). The induction drugs were mixed in the same syringe immediately prior to administration. The head collar was held for each induction and no other restraint or assistance given. The time taken to achieve lateral recumbency from the end of injection of alfaxalone was recorded and PR and f_R recorded again after induction.

The ponies were positioned in right lateral recumbency with the left hind limb raised to allow surgical access. Surgery was performed by one of two experienced surgeons. All times are recorded from the end of injection of induction agents. The time to exteriorisation of each testicle was recorded and surgical conditions, when the emasculators were applied to each testicle, were scored (1–4 with 1 representing the most muscle relaxation) (Table 1). Alfaxalone 0.2 mg kg^{-1} was administered intravenously if a response to surgery was observed, defined as movement or swallowing. The dose of alfaxalone was based on a previous pilot study. The time of administration and number of incremental doses were recorded. The times from anaesthetic induction to the end of surgery, first head lift, sternal recumbency and standing were recorded. The number of attempts to achieve sternal recumbency and standing were recorded and the

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