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THE USE OF MEDETOMIDINE AND BUPRENORPHINE FOR PREMEDICATION, KETAMINE FOR INDUCTION AND ISOFLURANE TO MAINTAIN GENERAL ANESTHESIA IN RABBITS. CASE STUDIES

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Abstract

The aim of this study was to assess the level of analgesia and safety of this aesthetic protocol. Many other anaesthetic protocols presented in scientific works are not enough detailed regarding their safety or their analgesic predicted effects. For this study we anesthetized three healthy rabbits. Two of them suffered a standard orchiectomy procedure and one suffered an orthopaedic intervention on humerus. All three received the same anaesthetic protocol. They were premedicated using medetomidine 0.25 mg/kg. After 10 minutes the rabbits were induced using ketamine 15 mg/kg subcutaneous. For analgesia we administered buprenorphine 0.03 mg/kg subcutaneous and meloxicam 0.6 mg/kg. Anaesthesia was maintained with isoflurane administered by facemask 1-1.5% in pure oxygen. During anaesthesia we assessed respiratory and cardiac parameters using a pulse-oximeter. After analysing our results we concluded that this protocol gives a predictable level of analgesia sufficient for most of procedures, even orthopaedic surgeries, and that our subjects were free of any cardio-respiratory secondary effects during anaesthesia.

Key words: *rabbit, medetomidine, buprenorphine, ketamine, isoflurane.*

INTRODUCTION

Injectable anaesthesia is frequently used in rabbits because it is an easy way to obtain general anaesthesia. In the scientific works there are only two other articles that present general anaesthesia using this protocol (Difilippo et al., 2004; murphy et al., 2010). Difilippo et al. assessed this protocol during cardiothoracic surgery while in murphy et al., the rabbit did not suffer any surgery. The lack of research over this protocol convinced us to study it more and especially the level of analgesia during painful surgeries. This research will help the implementation of this protocol in clinical practice for routine and special surgeries. Our results regarding safety, efficiency, and analgesia are confirming the other studies (Difilippo et al., 2004; murphy et al., 2010).

MATERIALS AND METHODS

For this study we used four rabbit subjects that came to Clinique vétérinaire universitaire de Liège for routine, castration by prescrotal technique, and orthopaedic surgery, one radial reduction with intramedullary nailing and one tibia reduction with intramedullary nailing and external fixators. They weighted between 0.37 and 4 kg and they were not starved before anaesthesia. The subjects were risk classified as ASA 2.

Rabbits were premedicated with medetomidine (sedator® 1mg/ml, eurovet animal health) 0.25 mg/kg subcutaneous. For analgesia subjects received buprenorphine (vetergesic ® 0.3 mg/kg, ecuphar) 0.03 mg/kg subcutaneous 10 minutes after premedication and meloxicam (metacam® 5 mg/kg, boehring ingelheim) 0.6 mg/kg subcutaneous at the end of anaesthesia. For anaesthesia induction the rabbits received ketamine (ketamine 1000® 100 mg/ml, CEVA) 15 mg/kg subcutaneous 10 minutes after premedication. From the moment that rabbits lost standing position we started to administer isoflurane (iso-ver® 1000mg/g, eurovet animal health) 1-2% in pure O_2 2 L/minute by face mask. An intravenous catheter was placed in the marginal ear vein and we administered a mixture fluid 10 ml/kg using an injection

pump: colloid (voluven® 6%, fresenius kabi deutschland gmbh) 44%, lactated ringer's (excel®, b. Braun medical inc.) 44% and glucose (glucose 30% lavoisier fl 500ml, chaix et du marais®) 12% of the mixture.

During anaesthesia they were monitored using clinical examination and pulse-oximeter every 5 minutes and data was recorded in an aesthetic report. Using clinical examination we monitored righting reflex, palpebral reflex and pedal reflex. Respiratory rate was measured by visually counting spontaneous breaths. Heart rate and oxygen tissue saturation was monitored using a pulse-oximeter applied over the tongue.

In the recovery period rabbits first received atipamezol (revertor® 5 mg/ml, virbac) 1 mg/kg intramuscular as antidote for medetomidine. They were also inoculated with metoclopramide (vomend® 5mg/ml, dechra veterinary products) 0.5 mg/kg to stimulate appetite and digestion after surgery. Recovery took place in a quiet place were the rabbits had access to fresh food and water. During recovery they also received pure oxygen 4 L/min in the cage.

Surgery technique was not part of this research and then it is not presented it in this case report.

RESULTS AND DISCUSSIONS

Premedication, induction and recovery took place smooth as murphy k.l. et al. (2010) also recorded in his study. After medetomidine premedication rabbits were sedated but they did not lose standing position or any reflexes. Ketamine administration produced smooth induction with losing sternal position. Ocular reflexes and pedal pinch reflex were also abolished after ketamine induction. Buprenorphine did not change anything in the anaesthetic status after administration. In this phase intubation was tried on all rabbits unsuccessfully by the blind technique contradicting the study of murphy k.l. et al. (2010). Difilippo s.m. et al. (2004) also recorded that using this anaesthetic protocol, but using higher dosages, all rabbits could be intubated. Other study used the same protocol for premedication and induction but no buprenorphine and still rabbits could be intubated by blind technique (Grint et al. 2008).all rabbits recovered gently from anaesthesia after stopping isoflurane and atipamezol inoculation.

Venous catheters were applied to all subjects in the lateral ear vein (Tutunaru et al. 2012). This protocol is efficient to desensitize external ear and to apply a venous catheter.

Cardio-respiratory parameters were first depressed just after induction but they returned to normal after 10-15 minutes without any analeptic treatment and it was not clinical important. During anaesthesia heart rate had a mean value of 220 beats/minute (140-300) equal to those recorded by murphy k.l. et al. (2010) and higher to those recorded by Difilippo s.m. et al. (2004). Heart rate variation was not correlated with surgery pain stimulation. Rabbits did not suffer of bradycardia during anaesthesia even if using medetomidine heart rate might fall (figure 1) (Tutunaru et al. 2011; Tutunaru et al. 2010).

Tissue oxygen saturation did not get lower than 92%, with a mean value of 97%. Respiratory rate was relatively constant during surgery with a mean value of 50 breath/minutes (30-100). Apnea was not recorded in any rabbit, not even in the induction phase. Apnea might not be recorded even if higher doses were used (Difilippo et al., 2004).

Buprenorphine reduces ventilation and tissue oxygenation by his depressive action on the respiratory function in conscious rabbits but do not influence blood pressure or heart rate (Shafford and Schadt 2008). This study did not assess end tidal carbon dioxide but still it did not record any fall in oxygen tissue saturation. This may be due to the fact that rabbits received pure oxygen by mask before, during and after anaesthesia.

The protocol achieved a level of analgesia sufficient for orthopaedic surgeries. In an earlier study over orthopaedic surgery were

Figure 1. Aspect during general anaesthesia

anesthetised with a lower dose of medetomidine and ketamine, maintained with isoflurane, and still analgesia was sufficient for the intervention (Zuijlen et al. 2010).

CONCLUSIONS

The article shows that the protocol used provides a safe anaesthesia for rabbit patients ASA II risk class.

The research also proves that the protocol provides sufficient analgesia for routine surgeries but also for orthopaedic intervention.

The study also wanted to demonstrate the applicability of this anaesthetic protocol in small animal clinics. All clinics equipped with an anaesthetic inhalator machine can embrace this protocol. Even if the clinic is not equipped with such machines this protocol might work but duration of anaesthesia is limited.

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