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SHORT COMMUNICATION

The incidence of spontaneous movements (myoclonus) in dogs undergoing total intravenous anaesthesia with propofol

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Abstract

Objective To evaluate the incidence of myoclonus (involuntary movements during anaesthesia, unrelated to inadequate hypnosis or analgesia, and of sufficient severity to require treatment) in dogs anaesthetized with a TIVA of propofol with or without the use of fentanyl.

Study design Retrospective clinical study.

Animals Dogs, undergoing general anaesthesia for clinical procedures between January 2012 and January 2013 and subject to TIVA with propofol.

Methods A retrospective analysis reviewed the medical and anaesthetic records. Animals with existing or potential neurological or neuromuscular pathology in the anamnesis or upon clinical examination and cases with incomplete clinical records were excluded. Myoclonus was considered as involuntary muscle contractions which did not cease following a bolus administration of propofol or fentanyl and, due to their intensity and duration, made continuation of the procedure impracticable without other drug administration. Tremors, paddling or muscle spasms, explicable as insufficient hypnosis or analgesia, and transient excitatory phenomena only present during the awakening phase, were not considered as myoclonus.

Results Out of a total of 492 dogs undergoing anaesthesia, six mixed breed dogs (1.2%), one male and five females, American Society of Anaesthesiologists (ASA) physical status I, median (range) weight 20.5 (7–37) kg and age 1.5 (1–5) years had myoclonus according to the aforementioned definition. In all subjects, myoclonus appeared within 20 minutes after induction of anaesthesia, and mainly involved the limb muscles. All subjects appeared to be in an adequate plane of anaesthesia before and during myoclonus.

Conclusions and clinical relevance This study shows that 1.2% of dogs, undergoing TIVA with propofol with or without fentanyl administration, developed myoclonus, which required to be, and were treated successfully pharmacologically. The cause of this phenomenon is yet to be determined.

Keywords anaesthesia, dogs, myoclonus, Propofol, TIVA.

Introduction

Propofol (2,6-diisopropylphenol) is one of the most widely used injectable anaesthetic agents for the induction and maintenance of general anaesthesia, both in humans and veterinary practice. In humans, a number of cases of spontaneous involuntary excitatory movements, presumably induced by the drug, have been reported. The occurrence of these

phenomena has also been reported in dogs (Hall & Chambers 1987; Davies 1991; Robertson et al. 1992). The incidence in dogs of involuntary spontaneous movements during propofol based total intravenous anaesthesia (TIVA) reported by Hall & Chambers (1987) was five cases out of 23 (21.7%). Davies (1991) reported 12 cases of excitatory spontaneous involuntary movements out of 159 dogs (7.5%). In her report propofol had been administered for induction and, in some cases, also for maintenance of anaesthesia, and in most of the cases the involuntary movements occurred upon induction or recovery of anaesthesia. Robertson et al. (1992), in an experimental study, reported spontaneous involuntary movements in six of 13 (46.1%) dogs in which anaesthesia had been induced and maintained with propofol for one hour. In this study, unlike the previous, almost all of the phenomena occurred several minutes after the administration of propofol and then continued for the duration of anaesthesia.

In human medicine many authors have pointed to the difficulty in accepting that a drug with strong evidence of anti-convulsant activity, in certain circumstances, could be pro-convulsant. However, propofol can induce seizure-like phenomena (SLP), excitatory phenomena, and/or disorder of muscle tone during induction and maintenance of, or emergence from anaesthesia in epileptic and non-epileptic patients (San-juan et al. 2010). Reports refer to qualitatively different effects and it is difficult to quantify the incidence of these complications.

The incidence of spontaneous movements in dogs anaesthetized with propofol appears to vary significantly from study to study. However, our impression is that the incidence of such phenomena, in clinical practice, is lower than previously reported. The objective of this retrospective study is to assess the incidence of involuntary spontaneous movements, of such severity as to interfere with the procedure, associated with the use of propofol in healthy anaesthetized dogs undergoing TIVA with propofol, and to define them in relation to the characteristics of their onset.

Materials and methods

A retrospective analysis was performed reviewing the medical and anaesthetic records of all dogs anaesthetized with a TIVA including propofol at the 'Clinica Veterinaria dell'Adriatico', Vasto, Italy, or at the Department of Animal Medicine, Production and Health of the University of Padua Italy, in a period between January 2012 and January 2013. In this study, subjects that presented with current, existing or potential (as a side effect of other disease processes) neurological or neuromuscular pathology in the anamnesis or upon clinical examination were excluded, as were with dogs undergoing drug treatment or exposed to diagnostic or therapeutic methods that could cause myoclonus phenomena or seizures. Cases with incomplete clinical records were excluded from the analysis.

Involuntary muscle contractions were considered myoclonus if they did not cease following a bolus administration of propofol or fentanyl and, due to their intensity and consistency, made it impossible to continue the procedure without the administration of other more effective drugs. Tremors, paddling or muscle spasms, which could be explained by an insufficient level of hypnosis or analgesia (and thus were responsive to a propofol or fentanyl bolus) and transient excitatory phenomena only present during the awakening phase, were not considered as myoclonus.

Results

The anaesthesia records of 509 dogs subject to various procedures were included in the study. Of these dogs, 17 then were excluded, as they were incomplete. Thus 492 dogs remained in the study. Overall, 202 (41.1%) of dogs were male and 290 (58.9%) female. The mean ± standard deviation age was 29 ± 9 months, and body weight was 16.9 ± 10.5 Kg. The most common breeds represented were mixed breed [122 (24.8%)]. Only 58 of 492 (11.8%) cases included in this study received premedication, and of these, 36/58 (62%) were premedicated with methadone (0.1–0.2 mg Kg^{-1}, Eptadone; Molteni Farmaceutici, Italy) and acepromazine (0.03–0.04 mg kg^{-1}, Prequillan; Fatro, Italy). The remaining 22/58 (38%) were premedicated only with methadone (0.1–0.2 mg Kg^{-1}). All dogs were given propofol (Propovet; Esteve, Italia) intravenously (IV) as part of the TIVA protocol. Fentanyl (Fentanest; Pfizer, Italy) was given as a co-induction agent to 387 (78.6%) cases and in 366 (74.4%) subjects fentanyl was administered by continuous infusion. A peripheral nerve block using bupivacaine 0.5% (Bupisen; Galenica Senese, Italy) was given in 84 dogs.

Six (1.2% of the total of 492 anaesthetics) cases of myoclonus emerged, which were in line with the