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EXPERIMENTAL EVALUATION OF PROPOFOL TOTAL INTRAVENOUS ANAESTHESIA (TIVA) IN DROMEDARY CAMELS

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ABSTRACT

Induction and maintenance of anaesthesia by bolus doses of intravenous propofol was carried out in 14 dromedary camels premedicated with xylazine (0.2 mg/kg). Camels were divided into 3 groups; Group 1 (1 camel) received 1, 1.5, 2 mg/kg to indicate the optimum dose, group 2 (8 camels) received 2.5 mg/kg, and group 3 (5 camels) received 3 mg/kg. Anaesthesia was maintained for period of 60 minutes in group 2 and 3. Time intervals between the injections were recorded, and heart and respiratory rates observed were undisturbed. The score of anaesthesia was rated as marginal in group 2 and satisfactory in group 3, but the quality of anaesthesia was judged to be not ideal in camels for clinical situations. However, the propofol at doses determined was safe to use and provided rapid recovery in dromedary camels.

Key words: Anaesthesia, camel, dromedary, propofol, TIVA

Intravenous drug administration to provide anaesthesia has evolved in the last decade to become a popular alternative to inhalation anaesthesia. This increasing popularity of TIVA is testament to its ease of use and perceived benefits (Campbell *et al,* 2001). Technical demands of gas anaesthesia and difficult intubation of the camel have made the TIVA a favourable option for this species. Propofol is a relatively new alkyl-phenol agent, short acting, rapidly metabolised by liver, characterised by rapid recovery and lack of any cumulative effect after its administration in bolus doses or by continuous infusion. It has been used as an intravenous anaesthetic in many species including humans, dogs and cats, sheep and horses (Nolan and Hall, 1985; Morgan and Legge, 1989; Duke, 1995; Mama *et al,* 1995; Lin *et al,* 1997; Garcia *et al,* 2002).

The aim of this study was to optimise the dose of propofol in dromedary camel, and to describe the characteristics of anaesthesia after its administration in bolus doses.

Materials and Methods

Fourteen healthy young dromedary camels, (10 males, 4 females, mean weight; 163.9 kg ± 27.8, aged between 6-9 months), were selected and moved to individual stocks one day prior to drug administration. Food, but not water, was withheld for 24 hours before trials. These were physically restrained, without sedation, for administration of xylazine (Ilium-Xylazil-20, Troy Laboratories, Australia) at 0.2 mg/kg intravenously (IV) into the jugular vein.

The camels were then divided into 3 groups:

Group 1: Preliminary study: One camel was randomly selected in order to determine the optimum dose of propofol. Three different treatments were carried out on this animal using propofol (Recoofol 10 mg/ml, Leiras Oy, Finland) at doses of 1, 1.5, 2 mg/kg.

Group 2: Anaesthesia was induced and maintained in 8 camels by propofol at dose of 2.5 mg/kg administered IV.

Group 3: Anaesthesia was induced and maintained in 5 camels by propofol at dose of 3 mg/kg administered IV.

All camels were monitored for clinical signs of anaesthesia, and an appropriate level of anaesthesia was considered to be achieved once spontaneous movements were absent. IV top-up of propofol of the same original dose in animals of group 2 and 3 was administered whenever the anaesthesia was inadequate. Time intervals between the injections were recorded. Heart and respiratory rates, were recorded immediately prior to any injection and thereafter at 10, 20, 30, 40, 50 and 60 minutes. Heart rate was evaluated

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by stethoscope, and respiratory rate was evaluated by observation of the chest movements. After 60 minutes the anaesthesia was discontinued, and the camels were checked until they recovered. All data are listed as mean (± SD) unless otherwise indicated.

Results

The doses of propofol (1, 1.5, 2 mg/kg) did not provide satisfactory anaesthesia for the camel in group 1 (preliminary study). General anaesthesia was achieved and maintained by top up bolus injections in all camels of group 2 (2.5 mg/kg) and group 3 (3 mg/kg) for period of 60 minutes. The score of anaesthesia was rated as marginal in group 2 by absence of movements and presence of a slow palpebral reflex, while the score of anaesthesia in group 3 was rated satisfactory as the palpebral reflex was lost mostly. Time intervals between the injections were recorded in table 1. Heart and respiratory rates observed were undisturbed at these trials as listed in table 2.

Table 1. Mean time intervals between the propofol injections.

	2nd Inj.	3rd Inj.	4th Inj.	5th Inj.
Group 1 Time (min)	9.8	11.6	11.2	11.7
Group 2 Time (min)	13.4	13.6	11	

Table 2. Mean values of heart and respiratory rates before and during the anaesthesia.

Time (min)	0	10	20	30	40	50	60
RR (min) Group 2	17	16.3	15.8	15	15.9	16.3	20.4
RR (min) Group 3	18	17.4	17.2	15.4	16.8	16.2	10.2
HR (min) Group 2	56.1	58.8	59.1	66.4	72	67.9	64.5
HR (min) Group 3	45	35.8	46.6	52.6	53.8	56.6	56.6

Recovery from anaesthesia was rapid as the camels sat-down 10-13 minutes after stopping propofol injection.

Discussion

Propofol is widely used for induction and maintenance of anaesthesia. Its chief advantage lies in its rapid detoxification and elimination resulting in rapid recovery from anaesthesia, even after multiple supplements (Hall *et al,* 2001). The dose rates chosen in this study were based on results of published literature 2 mg/kg (Fahmy *et al,* 1995), and 1 mg/kg (Kala *et al,* 2006). During this study, propofol produced a rapid induction in camels under the influence of the pre-anaesthetic xylazine, which is well known to produce a marked reduction in the induction dose needed. All doses of propofol used resulted in lateral recumbency within 1 minute. The initial doses of propofol (1, 1.5, 2 mg/kg) did not provide satisfactory anaesthesia for the camel in group 1, and this could be attributed to the low dosages of propofol used. However, levels of anaesthesia in camels of group 2 (2.5 mg/kg) was rated marginal by absence of movements and presence of slow palpebral reflex, and rated satisfactory in group 3 receiving the higher propofol dose as shown by temporary absence of the palpebral reflexes for very short periods of 3-5 minutes. The anaesthesia was not easy to maintain at constant level in all groups. The quality of anaesthesia produced and maintained by repeated bolus injections of propofol at doses determined was not generally ideal for camels in clinical situations. The use of propofol by continuous infusion to maintain anaesthesia could be more practical in camels than repeated bolus injections, as it has been reported in many other species (Nolan and Hall, 1985; Hall and Chambers, 1987; Nolan and Reid, 1993; Correia *et al,* 1996; Flaherty *et al,* 1997; Bettschart-Wolfensberger *et al,* 2001).

Nolan (2004) stated that the use of propofol as the sole agent for TIVA is generally unsatisfactory, since the concentration levels required to eliminate responses to surgery induce cardiovascular and respiratory depression. Consequently, it is necessary to supplement the use of propofol with an analgesic drug such as opioids, ketamine, and the alpha2 adrenoceptor agonist as have been described (Correia *et al,* 1996; Nolan *et al,*1996; Flaherty *et al,* 1997; Hughes and Nolan, 1999). The literature suggests that apnoea and a decreased heart rate is common when propofol is used, but in this study, the heart and respiratory rates were within the normal range for camels throughout the period of anaesthesia, except a decreased heart rate after induction in group 2. The great attraction for using propofol is the rapid and complete, excitement-free awakening, irrespective of the duration of anaesthesia (Hall *et al,* 2001). The recovery from anesthesia in this study was generally regarded as rapid and excellent, and that is clearly related to the drug pharmacokinetics, and also is similar to the other findings with other species (Morgan and Legge, 1989; Mama *et al,* 1995; Hughes and Nolan, 1999).

In conclusion, this study has shown that the propofol at doses of 2.5-3 mg/kg was safe to use in dromedary camels to induce anaesthesia, maintained satisfactory level of anaesthesia by repeated bolus injections for a period of 60 minutes, and provided rapid and high quality recovery. However, the quality of anaesthesia produced and maintained was not

ideal for clinical situation. In addition, the current cost of propofol together with its current manufacturer concentration (10 mg/ml) does not make it practical for use in camels except perhaps for calf camels.

Finally, further studies will be needed in dromedary camels to determine the effectiveness of propofol infusion with a target-controlled infusion system, and to find out an ideal regimen including propofol in combination with other anaesthetics drugs.

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GENOME STUDY OF RACING CAMELS-COLLABORATION OF UAE AND INDIA

Dr.K.M.L. Pathak, Director, National Research Centre on Camels, Bikaner and Dr.T.J. Rasool, Assistant Director General (AP & B), Indian Council of Agricultural Research, New Delhi were invited at Abu Dhabi (UAE) from 10-15 December 2008 by Head, Overseas Project, Department of President Affair, Govt of Abu Dhabi to establish a world class DNA based testing laboratory for riding camels. The progency of these camels will be tested at the new laboratory which will be created at Al-Ain (UAE).

National Research Centre on Camels, Bikaner under the auspices of Indian Council of Agricultural Research, New Delhi will provide technical knowhow for this laboratory and complete genome study of racing camels will be conducted by the scientists in this laboratory.

INTERNATIONAL TRAINING PROGRAMMES FOR CAMEL SURGERY IN 2009

Indian Council of Agricultural Research announces an international training programme to be conducted in August/September 2009 by Rajasthan Agricultural University at Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Science, Bikaner, Rajasthan, India. The four week programme is entitled, "An appraisal of surgical techniques of dromedary camels". Total number of trainees will be 15 and course fee is US $ 2000 per trainee. The Course Director will be Dr.T.K.Gahlot, Head, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Science, Bikaner 334001, Rajasthan, India.

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REPORT OF THE MEETING OF THE OIE AD HOC GROUP ON CAMELIDAE DISEASES

Over the last decades, interest on the camel family is on the rise. This new awareness has also reached the World Organisation for Animal Health (OIE). On 8 to 10 July 2008 the OIE has invited 6 camel scientists from different countries to their headquarters in Paris to form an AD HOC Group on *Camelidae* diseases. The Deputy Director General at the OIE emphasised the need to focus on the most important camel diseases. After 3 days of intensive discussions, a detailed table was compiled which shows the most significant diseases of dromedary, bactrian and New World camelids followed by a proposal of the experts to the OIE. These diseases were categorised in viral, bacterial and parasitic. Every section is described in 3 groups—

Group I = Significant diseases

Group II = Diseases for which camelids are potential pathogen carriers

Group III= Minor or non-significant diseases

Every section is bearing information regarding diseases identification of the agent, serological tests, recommendations for diagnostics and recommendations for prevention. We are giving the details of its annexure IV pertaining to dromedary section only for information of readers.