

Propofol, Ketamine and ketofol as Total intravenous Anaesthesia in Dogs

B. Saikia¹, K.K. Sarma², D. Kalita³, B.K. Sarmah³, A. Phukan², S. Goswami²

¹Ph.D scholar, department of Vety Surgery & Radiology

²Professor College of veterinary Science, AAU, Khanapara, Guwahati

³Associate Professor College of veterinary Science, AAU, Khanapara, Guwahati

Department of Veterinary Surgery & Radiology, College of veterinary Science, AAU, Khanapara, Guwahati-781022, Assam

*Corresponding Authors

Name: B. Saikia

Email: bsbasanta@rediffmail.com

Abstract: Inhalation anaesthesia is routinely used for maintenance of anaesthesia in dogs. Sophisticated anaesthetic machine is prerequisite to administer inhalant anaesthetic. So, the non –availability of anaesthetic machine in the field makes its use practically unfeasible for the field veterinarians. Total intravenous anesthesia (TIVA) can provide a valuable alternative to this method, whereby several different drugs or drug combinations and different means of administration can be used.

Keywords: TIVA, propofol, ketamine, ketofol, dog, xylazine and atropine

INTRODUCTION:

Surgical management of canine patients considered to be painful & produce an inflammatory response. Appropriate selection of anaesthetic and analgesic techniques is essential for the well-being of the surgical patient not only because of ethical reasons but also to decrease the risk of complications, facilitate the healing process, and avoid the development of chronic pain [1]. The general anaesthetic agents used for this purpose should be able to produce adequate level of sedation, analgesia, muscle relaxation and should have a wide margin of safety. It should not cause any long term physiological alteration. But unfortunately no such agent has been found so far and all the agents have been found to be lacking in some way or the other. To get most of the desire effect of anaesthesia a combination of drugs is used called “balanced anaesthesia”, [2]. Till recently, inhalation agents have remained the routine choice for maintenance of anaesthesia. One of the principal requirements is the availability of sophisticated delivery system for gaseous and volatile anaesthetic, which allows the anaesthetists to have a fine degree of control on the concentration administered to the patient. In spite of this advantage, major limitations of inhalation anaesthesia are it requires the use of a cumbersome and costly anaesthetic machine. Another of the major disadvantages is the exposure of operating-room personnel to the pollution in the ambient air since the operating room air is contaminated by vaporizer filling, by leaks in the patient breathing circuit [3].

To administer inhalant anaesthetic in the field makes its use practically unfeasible for the field veterinarians. In field conditions intramuscular or

intravenous anaesthesia is usually the method of choice, as it can be performed with limited facilities at hand in the animal hospital [4].

Total intravenous anaesthesia (TIVA) is a technique of general anaesthesia that uses agents given solely by the intravenous route, and in the absence of all inhalation agents. The concept of total intravenous anaesthesia (TIVA) is simple. An i/v line is the only prerequisite, and everything needed for general anaesthesia is supplied through this line.

TIVA always involves the delivery of a bolus dose or a fast loading infusion to achieve an adequate blood concentration of the anaesthetic drug. Maintenance of anaesthesia can be obtained by administering intermittent boluses injection (IBI), by continuous rate infusion (CRI) or by target controlled infusion (TCI). The IBI of a drug is very simple and safe. When patient react to pain stimuli (during surgery) an incremental calculated dose is given through the pre-existing i/v line and again lead the patient to surgical anaesthesia. Procedure is simple but result in high peak plasma concentrations and excessive depth of anaesthesia for initial period[5]. Both infusion techniques, on the other hand, produce more stable plane of anaesthesia.

PREMEDICATION:

An appropriate selection of premedication drugs can significantly improve intraoperative cardiovascular stability, perioperative analgesia and the quality of recovery. It is important to select preanesthetic drugs based upon the needs of the individual patient and its physical status[6]. For procedures associated with peri-

and postoperative pain, premedication should always include an analgesic [7].

Atropine sulphate, an alkaloid is an anticholinergic agent which reduces salivation, bronchial secretion and blocks the effect of impulses in the vagus nerves. Xylazine HCL and Medetomidine alpha 2 adrenoceptor agonist to be used as sedative and analgesia in animals.

INDUCTION AND MAINTENANCE AGENT:

The ideal intravenous anaesthetic agent for TIVA should be painless and non-irritant on injection, while rapidly inducing sleep with a minimum of respiratory and cardiovascular side effects. In addition, the potential for anaphylactoid and other allergic reactions should be very low [8].

Propofol is a newer generation injectable anaesthetic agent which was introduced in veterinary medicine in the 1990's[9]. In general, propofol induces a rapid, smooth induction, followed by a short period of unconsciousness. Propofol is rapidly redistributed from the brain to other tissues and is also efficiently eliminated from plasma by hydroxylation, which

explains its short action and the rapid recovery [10]. Due to these pharmacokinetic properties, it is considered to be a suitable drug for the maintenance of anaesthesia by continuous rate infusion [5]. One important issue is that propofol has only minimal analgesic properties. This explains the need for concurrent administration of analgesics when propofol is used during painful procedures.

Ketamine is a dissociative anaesthetic as it interrupts ascending transmission from those parts of the brain responsible for unconscious and conscious functions. Ketamine possibly increases muscle tone and it induces spontaneous movement and, occasionally, convulsions. To reduce these undesirable effects, it is often used in conjunction with propofol, benzodiazepines, acepromazine or α 2-agonists.

Ketofol (ketamine/propofol combination) was used for procedural sedation and analgesia. The opposing haemodynamic and respiratory effects of each drug may enhance the utility of this drug combination, increasing both safety and efficacy and allowing reduction in the dose of propofol required to achieve sedation[11].

Table-1: Total intravenous anaesthesia (TIVA) protocols in dogs

Anaesthetic protocol	Preanaesthetic Dose and route	Anaesthetic dose and route for Induction	Anaesthetic dose and route for Maintenance up to 90 minutes
Protocol-I	Atropine@0.04mg/kg I/M, Xylazine @ 0.5 mg/kg,I/M	Propofol @ 5mg/kg,I/V	Propofol @2.5mg/kg,I/V (as Intermittent Bolus Injection) each time as required when movement is detected.
Protocol-II	Atropine@0.04mg/kgI/M, Xylazine @0.5 mg/kg,I/M	Ketamine @ 5mg/kg,I/V	Ketamine @ 2.5 mg /kg I/V (as Intermittent Bolus Injection) each time as required when movement is detected.
Protocol-III	Atropine@0.04mg/kg I/M, Xylazine @ 0.5 mg/kg,I/M	ketofol@2mg of each drug /kg,I/V	Ketofol@ 1mg of each drug /kg,I/V (as Intermittent Bolus Injection) each time as required when movement is detected.

CONCLUSION:

Total intravenous anesthesia provides the veterinarian with a useful alternative for inhalation anesthesia in dogs, with a propofol- or ketamine- or ketofol based protocol as the most evident choice. Furthermore, premedication and the administration of analgesics should not be overlooked, and the depth of the anesthesia should be assessed to avoid unwanted complication.

REFERENCES:

- Slings by LS, Waterman-Pearson AE; Postoperative analgesia in the cat after ovarian hysterectomy by use of carprofen, ketoprofen, meloxicam or tolfenamic acid. *J. Small. Anim. Pract.*, 2000; 41: 447-450.
- Thurmon JC, Short CE; History and overview of veterinary anesthesia. In: Tranquilli W.J., Thurmon J.C., Grimm K.A (editor). *Forth*

- editin. Blackwell publishing Ltd Oxford, 2007; 3-6.
- Steffey EP, Mama KR; Inhalation anesthetics. In: Tranquilli WJ, Thurmon JC, Grimm KA, (editors). *Lumb & Jones' Veterinary Anesthesia and Analgesia*. Blackwell Publishing Ltd, Oxford, 2007; 355-393.
- Kumar A, Kumar A, Tyagi SP, Sharma SK, Sharma R; Ketofol as a general anaesthetic agent in diazepam or midazolam premedicated and halothane anaesthetized dogs. *Indian J. Vet.Surg.*, 2014; 35(1): 31-34.
- Musk GC, Pang DS, Beths T, Flaherty DA; Target controlled infusion of propofol in dogs' evaluation of four targets for induction of anaesthesia. *The veterinary Record*, 2005; 157:766-770.
- Murrell JC; Premedication and sedation. In: Seymour C, Duke-Novakovski T; (editors). *BSAVA Manual of Canine and Feline*

-
- Anaesthesia and Analgesia. Second edition. British Small Animal Veterinary Association, Gloucester, 2007; 120-132.
7. Bednarski RM; Anesthesia, analgesia and immobilization of Dogs and Cats. In: Tranquilli, W. J., Thurmon, J. C., Grimm, K. A. (editors). Lumb & Jones' Veterinary Anesthesia and Analgesia. Fourth edition. Blackwell Publishing Ltd, Oxford, 2007; 705-715.
 8. Waelbers T, Vermoere P, Polis I; Total intravenous anaesthesia in dogs. Vlaams Degeneskundig Tijdschrift. 2009; 78:160-169.
 9. Tsai YC, Wang LY, Yeh LS; Clinical comparison of recovery from total intravenous anesthesia with propofol and inhalation anesthesia with isoflurane in dogs. The Journal of Veterinary Medical Science / the Japanese Society of Veterinary Science, 2007; 69:1179-1182.
 10. Zoran DL, Riedesel DH, Dyer DC; Pharmacokinetics of propofol in mixed-breed dogs and greyhounds. American Journal of Veterinary Research, 1993; 54: 755-760.
 11. Daabiss M, Elsherbiy M, Otibi RA; Assessment of different concentration of Ketofol in procedural operation. BJMP. 2009; 22 (1): 27-31.