ANESTHETIC, SOME BIOCHEMICAL AND GASES CHANGES DURING THIOPENTAL, PROPOFOL WITH HALOTHANE PROTOCOL IN DOGS UNDERGOING PNEUMOPERITONEUM

Layth al- kattan

Department of Surgery and Theriogenology, College of Veterinary Medicine

University of Mosul, Mosul ,Iraq.

Keywords ;Thiopentone, Halothane ,Pneumoperitoneum.

(Received 9 september 2013, Accepted12 October 2013)

ABSTRACT

The experiment was carried out in twelve adult healthy ' dogs of both sexes via closed system of anesthesia. The animals were divided into two group's six animals of each. The first group was treated with a protocol of thiopentone sodium I.V. at the dose (20mg/kg B.wt, premedicated with diazepam . The second group was treated with protocol of propofol I.V. (2mg /kg B.wt) premedicated with diazepam and undergoing pneumoperitoneum with CO_2 anesthesia maintained with halothane 2%. The anesthetic, behavioral, biochemical changes were recorded during different periods. The results showed respiratory depression but marked hypoxia not observed at early duration of anesthesia. The endotracheal tube freely introduced within 3-2.5 min. The CO_2 gas smoothly delivered into the abdomen without serious complications. In the second group, the induction was rapid with smooth and unexcited recovery and excellent muscle relaxation. In conclusion, the two combination proved to be an effective anesthetic protocol and adequate for minor rapid surgical interventions .

INTRODUCTION

The term pneumoperitoneum refers to the presence of air within the peritoneal cavity (1). It is done successfully in dogs in the dorsal recumbent at the pressure between 8-12mm\Hg without serious complications (2). Sometimes mild complications related to CO_2 may developed as lower pH, hypoxemia and hypercapnia (3, 4,5). Anesthesia during the laparoscopic procedure is more technically demanding ventilation and acid base balanced (3). Inhalant anesthetics are used widely for producing general anesthesia in animals and human. (6).Problems associated with inhalation anesthesia occur more frequently with more pronounced hypotension, hypoventilation, and reduction of cardiac output (7). On theother side, rapid induction should be followed by tracheal intubation (8). Just as with inhalation anesthesia, endotracheal intubation and the administration of oxygen are highly recommended during TIVA (9). Different anesthetics, their combinations may alter blood gas and acid-base compositions (10). Propofol, it's an intravenous anesthetic that is being used increasingly in human and animals (11) and produces faster recovery than thiopental these properties make propofol desirable for induction and maintenance of anesthesia to perform surgical interventions (12). Thiopentone is the most popular intravenous anesthetic in the world, it has a long history as an induction agent in dogs (13). In rabbits and other laboratory animals, thiopentone has been used mostly as a bolus for induction, and also as a continuous infusion (14). Endotracheal intubation is normally not a difficult procedure in most dogs, but many potential problems associated with endotracheal intubation may occur include misplacement of the tube, tracheal or laryngeal damage, over-inflation of the tube's cuff leading to reduced blood flow to the mucosa, and dislocation of the tube if it is not properly secured (15). The purpose of present study was to estimate the effects of

pneumoperitoneum on anesthetic and some biochemical parameters during two different anesthetics protocol in dogs

MATERIALS AND METHODS

The investigation was carried out in 12 adults' dogs, aged 2-3 years, with a mean body weight of 17.4 ± 2.7 kg, divided into 2 groups. The first group of dogs were subjected to standard halothane2%(Syria) anesthesia. premedication with (0.2 mg \kg) diazepam(Syria) and induction with 20mg /kg B.wt) of Thiopentone (India) intravenously. Pneumoperitoneum was created by carbon dioxide introducing into the peritoneal cavity. Intra-abdominal pressure was maintained automatically at the desired level (12 mmHg) during surgery with flow rate 5L\min (2).The trachea was intubated to maintain source of O_2. A 2%halothane vaporizer and closed circuit were used. (Anesthetic machine/ 7400A). Arterial blood sample collected anaerobically by using heparinized test tubes at period of 10, 30 min post injection and at recovery time for blood gas analysis and biochemical examination as Potassium(K), Sodium (Na), calcium(Ca). Clinicophysical parameters were recorded also the quality of induction and recovery period , color of mucous membrane, recovery times and incidence of side-effects were recorded. Muscle relaxation was evaluated depending on the flexion and extension of dog limbs. Four score degree included (0 = no relaxation, 1 = mild degree of relaxation, 2 = fair relaxation3 = Excellent relaxation). At second group a protocol of 2mg \kg B.wt intravenously propofol1%(Dong kook) premedicated with diazepam 0.2 mg\kg .Sample collecting and data recording of this just the same of the first group. Two and one way ANOVA was used to determine the statistical significance. P value was considered significantly at $P<0.05$ differences of mean values from the baseline and between groups.

RESULTS

Both groups showed signs of calming followed the administration of Diazepam premedication. Induction of anesthesia was smooth and uneventful, and satisfactory conditions for endotracheal tube intubation .The intubation done without serious problems. It was faster took 1.5-2 min in both groups, easy and convenient. So inhalation anesthesia and ventilation delivered smoothly. Quality of anesthesia in the

second group was characterized by excellent muscle relaxation to fair relaxation following anesthesia in all anesthetized animals , hypnosis, and analgesia slight pale mucous membrane and tachypnea was detected. None of the dogs, in this study, responded with gross purposeful movement to external stimuli during a period of (41 ± 4. 5 sec.) of anesthesia in the first group and (39± 2.3 sec.),in second group, there was mild acidemia and hypoxemia. Signs of pain at the time of injection of propofol,restlessness and movement occurred but subsided during the recovery period, signs of bradycardia were developed simultaneously with of transit apnea especially during induction which overcomes with adequate ventilation by oxygen supply. Blood gas analysis showed no significant changes in blood PH during anesthesia in first group. In second group there is mild decrease in blood PH after 5 min of anesthesia (Table 1) simultaneously there are no significant increase in PCO_2 after 30 min of anesthesia during a protocol of thiopental \diazepam\halothane anesthesia (Table 2). PO_2 significantly increased after 30 min of anesthesia then return to the lower value at recovery time (Table 3) in both treatment groups. Biochemical parameters (Na,K and Ca) had no significant changes during anesthesia in both anesthetic protocol(Table 4,5,6).

DISCUSSION

The purpose of using any induction agent is to provide rapid transfer to unconsciousness status and to allow endotracheal intubation for airway protection and ventilatory support with rich inspired oxygen concentrations (16). Endotracheal intubation and ventilation is advice necessity with administrations of many anesthetic protocols and total intravenous anesthesia (TIVA), so artificial ventilation must also be taken into consideration. TIVA, provided a valuable alternative to this method, an alternative whereby several different drugs or drug combinations and different means

of administration can be used(9). In this study, thiopentone was used only for induction because repeated dosing causes accumulation of the drug in the body fat and saturation of the tissue sites. This, together with the slow liver metabolism, led to higher plasma levels. Thus causing serious cardiorespiratory depression and prolonged recoveries. Therefore, thiopental should not be used for the maintenance of anesthesia (17). Its short duration of action is not due to the rapid elimination but due to phenomenon of redistribution (18).As contrast, propofol used for maintenance of anesthesia and the rapid injection of propofol can result in apnea and, after repeated or continuous propofol dosing, respiratory depression with hypercapnia can occur (17).The most common adverse effects observed with the use of propofol are pain on injection and mild pain was recorded in small animals. Inspire of these effects, the recovery from propofol has excellent properties due to its pharmacokinetic profile (19). Peumoperitoneum with CO_2 is safe provide suitable for laparoscopic. In both groups, the using of anesthetic scores were not completely accurate to estimate anesthetic condition in some cases this may due to complex nature of pain (20). The pale mucous membrane in second group due to peripheral vasoconstriction (20). There was significant increase of Pao_2 after 30 min it may due to propofol-induced decreases in cardiac output and ventilation (21).The obtained results were not considered with (22). Propofol alone induce apnea and respiratory distress overcome with positive ventilation these results were considered with(12) this indicates that propofol has a respiratory depressant activity. Administration of supplemental oxygen might have reduced the degree of hypoxia observed after propofol administration. Mild hypoventilation and decrease in respiratory rate were observed with the institution of general anesthesia as compared to the baseline values in the conscious animals this observation agree with (1,10,23). Both agents Propofol and thiopentone

cause respiratory depression via their action on central inspiratory drive and ventilatory response to PaCO2 (24)

In conclusion, the Induction of anesthesia was smooth and uneventful. A minimal complication occurs, no significant changes on biochemical and clinicophysical criteria were noticed during pneumoperitoneum. The two combination proved to be an effective anesthetic protocol and adequate for minor surgical procedures.

Table 1. PH value in two anesthetic protocols at zero time and post anesthesia up to recovery

Time interval	Zero time	After 5 min Of induction	After 30 min Of induction	Recovery Time
Thiopental\diazepam\halothane	7.11± 0.21	7.3±0.14	6.9±0.59	7.1±0.1
Propofol \diazepam\halothane	7.2±0.36	6.4±0.4	7.4±0.3	7.0±0.2

Table 2. $Paco_2$ value in two anesthetic protocols at zero time and post anesthesia up to recovery

Time interval Groups	Zero time	After 5 min Of induction	After 30 min Of induction	Recovery Time
Thiopental \diazepam\halothane	35± 3.6	32.1±1.5	38.1±4.5	34.6±2.5
Propofol \diazepam\halothane	39±3.5	38.1±2.5	33.5±5.1	36.1±3.1

Table 3. Pao_2 value in two anesthetic protocols at zero time and post anesthesia up to recovery

Time interval Groups	Zero time	After 5 min Of induction	After 30 min Of induction	Recovery Time
Thiopental \diazepam\halothane	169.8± 22.2 A,a	196±11.7 A,a	250.1±38.1 B,a	113.5±14.7 C,a
Propofol \diazepam\halothane	281.5±8.2 A,b	278.2±15.4 A,b	328±37.1 B,b	241.5±15.3 C,b

The different capital letters means significant differences within same raw, and

different small letters means significant differences between two groups $P<0.05$

Table 4. Na mmol\L value in two anesthetic protocols at zero time and post anesthesia up to recovery

Time interval	Zero time	After 5 m in Of induction	After 30 min Of induction	Recovery Time
Thiopental\diazepam\halothane	120.6± 12	118±3.4	133.8±7.4	140.6±12.9
Propofol \diazepam\halothane	146.6±9.9	148.3±10.4	133.6±6.6	138±9.8

Table 5. Kmmol\L value in two anesthetic protocols at zero time and post anesthesia up to recovery

Time interval Groups	Zero time	After 5 min Of induction	After 30 min Of induction	Recovery Time
Thiopental \diazepam\halothane	4± 0.3	3.9±0.2	3.9±0.1	3.6±0.5
Propofol\diazepam\halothane	3.6±0.2	3.5±0.5	3.3±0.2	3±0.3

Table 6. Ca mmol\L value in two anesthetic protocols at zero time and post anesthesia up to recovery

Time interval Groups	Zero time	After 5 min Of induction	After 30 min Of induction	Recovery Time
Thiopental \diazepam\halothane	1.2± 0.06	1.3±0.07	1.2±0.06	1.3±0.07
Propofol \diazepam\halothane	1.3±0.2	1.4±0.6	1.2±0.07	1.3±0.04

صفات التخدير وبعض التغييرات الكيموحيوية وغازات الدم المرافقة لبروتوكولات من الثايوبنتون والبروبافول والهالوثان في الكلاب الواقعة تحت تأثير الاسترواح البطني

ليث محمود القطان

فرع الجراحة,كلية الطب البيطري ,جامعة الموصل,الموصل ,العراق

الخلاصة

اجريت الدراسة الحاليه على اثنا عشر كلب سليم من كلا الجنسين باستخدام النظام التخدير المغلق .قسمت الحيوانات الى مجموعتين متساويتين كل مجموعة مكونه من ستة حيوانات . المجموعة الولى تم معاملتها ببروتوكول من الثايوبنتون صوديوم حقنا بالوريد وبجرعة 20 ملغم لكل كغم من وزن الجسم الحي مسبوقة بجرعة ممهدة من الدايزيبام . المجموعة الثانية تم معاملتها ببروتوكول من البروبافول وبجرعة 2 ملغم لكل كغم من وزن الجسم الحي مسبوقة بجرعة ممهدة من الدايزيبام وتم وضع جميع الحيوانات تحت تاثير الاسترواح البطني بغاز ثاني اوكسيد الكاربون . وتم تحقيق استمرارية التخدير بواسطة الهالوثان وبتركيز 2%.تم اتسجيل معايير التخدير وسلوك الحيوان والتغييرات الكيميا ئية الحيويه وخلال فترات مختلفة . اثبتت النتائج حصول تثبيط للتنفس لكن حصول نقص الاوكسجين الواضح لم يلاحظ خلال فترة الافاقة المبكرة . اتم ادخال الانبوب القصبي بسلاسه بعد 3-2,5 دقيقة اما غاز ثاني اوكسيد الكاربون فقد انساب بسلاسة الى داخل التجويف البطني بدون مضاعفات شديدة . في المجموعة الثانية فترة الحث والشروع بالفعل كانت سريعة سلسه مع افاقة غير مهيجة وارخاء ممتاز للعضلات نستنتج ان كلا المزيجين احدثا تخدير فعال وبشكل كاف لاجراء العمليات الصغرى والسريعة

REFERENCES

1. OzlemG, Dilek OE,Didar A ,Zihni M. and Esma Y. Investigation of the effects of CO_2 insufflations on blood gas values during laparoscopic procedures in pigs. Turk. J.Vet. Anim. Sci.2012; .36(2): 59-64

2. Al-Hasan AM and Al-Heani WA. Laparoscopic partial splenectomy in dogs .J.of Animals and Veterinary Advance. 2009; 8(11):2232-2232

3. FukushimaFB, MalmCAndrade ME, Oliveria HP, Melo EG, Calderia FM, Gheller VA, PalharesMS,Macedo SP, Figueired M and Silva MX. Cardiorespiratory and blood gas alterations during laparoscopic surgery for intrauterine artificial insemination in dogs. Can. Vet.J. 2011; 52:77- 79

4. Pang DS Allaurej J,Rondenay Y, Kaartinen J, Cuvelliez SG andTroncy E (). The use oflingual venous blood to determine the acid-base andblood-gas status of dogs underanesthesia. Vet. Anaesth. Analg. 2009; 36: 124-132.

5. Kelmer E, Scanson LC, Reed A and Love LC. Agreement between values for arterial and end-tidal partial pressures of carbon dioxide in spontaneously breathing, critically ill dogs. J.Am. Vet. Med. Assoc. 2009; 235:1314-1318.

6. Gil AG, Silván G,Villa A,Millán,P Martínez-Fernández L and Illera ,JC .Serum biochemical response to inhalant anesthetics in New Zealand white rabbits.J AmAssoc Lab Anim Sci. 2010; 49(1): 52-6.

7. LyonL. Ruminants and Swine Anesthesia. Veterinary Surgery I, VMED, 2006; 7412.

8. GrubbT.Anesthesia for patients with respiratory disease and/or airway compromise. Topics Companion Anim. Med., 2010; 25: 120-132.

9. WaelbersT, Vermoere P and Polis I.Total intravenous anesthesia in dogs Vlaams Diergeneeskundig Tijdschrift2009.

10. Polis I, Gasthuys F andVanham L. Recovery times and evaluation of clinical hemodynamic parameters of sevoflurane, isoflurane and halothane anesthesia in mongrel dogs. J. Vet. Med. A. Physiol. Pathol. Clin. Med. 2001; 48: 401- 411.

11. Sebel, PS.Propofol: A new intravenous anesthetic. Anesthesiology., 1984; 71: 260-277.

12. MadanKA, Korde JP,Das KA and Rasrogi SK. Propofol -induced electroencephalographic, electrocardiographic and spirometric changes in goats. Vet. Archive.(2010); 80:27-39.

13. Carroll GL. Small Animal Anesthesia and Analgesia. Ames, Iowa Blackwell Publishing Co, 2008. 167-172

14. Wyon N, Eriksson H, Yamamoto Y andLindahli SG. Vecuronium-induced depression of phrenic nerve activity during hypoxia in the rabbit. Anesth and Analg.1996,82: 1252-6.

15. Muir WW, Hubbell JA, Bednarski RM. Handbook of Veterinary Anesthesia. St. Louis, Mosby, Missouri. 2007. 211-216.

16. Ryan SD and Wagner A E. Cesarean Section in Dogs: Anesthetic Management. Compendium Vet.com. 2006.

17. KastnerSB. .Intravenous Anesthetics.In (Seymour C., Duke-Novakovski T). BSAVA Manual of Canine and Feline Anesthesia and Analgesia. 2nded. British Small Animal Veterinary Association, Gloucester, England. 2007; 133-149.

18. HyS. Rapid sequence induction and intubation. Hong Kong j. emerg. med., 2001; 8(2):113-118.

19. Gin T, Gregory MA Chan K and Oh TE .Maternal and fetal levels of propofol at caesarean section. Anaesth Intensive Care. 1990; 18:180.

20. Mathews KA.Pain assessment and general approach to management. EUA: Veterinary Clinics of North America. Small Animal Practice.2000;30, 729-755.

21. Mcdonell W. Respiratory System. In: Lumb and Jones' Veterinary Anesthesia, 3rd ed. (Thurmon J.C., W.J. Tranquilli, G.J. Benson Eds.) Williams and Wilkins, Baltimore. 1996 pp: 115–147.

22. Mcnally EM, Roberson SA and Pablo LS. Comparison of time to desaturation between preoxygenated and non preoxygenated dogs following sedation with acepromazine maleate and morphine and induction of anesthesia with propofol. Am J Vet Res. 2009: 70 (11): 1333–8.

23. Alkattan, LM and Helal MM. .Effects of ketamine-xylazine and propofol-halothane anesthetic protocols on blood gases and some anesthetic parameters in dogs. Vet. World. 2013; 6(2): 95-99.

24. Grounds RM, Twigley AJ, Carli F, Whitwam JG, Morgan M. The haemodynamic effects of intravenous induction. Comparison of the effects of thiopentone and propofol. Anaesthesia 1985;40: 735-74