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Comparative Experimental Study on Two designed Intravenous Infusion Anaesthetic Combinations in Local Donkeys Breed

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Abstract

TWO TOTAL intravenous anesthetic (TIVA) combinations were investigated for their anesthetic efficacy, biochemical effects, and clinical observations in donkeys. The study was carried out on 10 donkeys 5-8 years old and 95 ± 5.9 kg body weight which were equally divided into two groups. Combination (A) composed of Xylazine hydrochloride 1.1 mg/kg, Ketamine hydrochloride 2.2 mg/kg, Diazepam 0.1 mg/kg, and a continuous intravenous infusion of 2 mg/kg propofol. Combination (B) comprised nefopam 0.4 mg/kg, Xylazine 1.1 mg/kg, 2.2 mg/kg Ketamine and continuous intravenous infusion of 2 mg/kg propofol. The onset of anesthesia, duration of induction, maintenance, and recovery periods were recorded. Also, heart, and respiratory rates, body temperature, blood picture, and serum biochemical were assessed before and after administration of each combination. Combination (A) exhibited a rapid onset of induction within 46± 3.8 seconds, maintained anesthesia for 45 minutes after continuous propofol infusion for 19± 2 minutes, followed by very smooth recovery within 68 minutes from induction. In contrast, Combination (B), showed slow induction within 11 minutes, maintained anesthesia for 31 minutes with continuous propofol infusion for 19±2 minutes, and showed smooth recovery within 45 minutes. In conclusion, Combination (A) is considered economically suitable for major surgical interferences. While, Combination (B) is preferred for pain management and shorter surgical interferences.

Keywords: Donkeys, Intravenous anesthesia, Ketamine, Xylazine, Propofol, Diazepam and Nefopam.

Introduction

Equine practitioners frequently use general anesthesia to maximize individual safety and improve accuracy. However general anesthesia in horses, particularly prolonged anesthesia, possess a risk compared with other domestic species [1].

Therefore, Total intravenous anesthesia with propofol infusion (TIVAPl) is the only practical option for inhalation anesthesia in equines because it has been suggested to have better cardiovascular and respiratory function maintenance, quieter recovery, and other potential benefits over inhalation anaesthesia [2].

Various techniques can be used for induction of general anesthesia based on the available drugs, the weight and health status of the animal and familiarity with multiple protocols [3]. Dissociative medications as ketamine have recently been shown to offer additional options for routine donkey anesthetic management [4].

TIVA has gained popularity in horses due to its advantages over inhalational anaesthesia, including reduced cardiorespiratory depression [5]. A smooth induction and recovery resulted from the administration of ketamine/ xylazine hydrochloride as the cataleptic effects of ketamine HCl were

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mitigated by the sedative and the relaxing effects of xylazine HCl [6].

The use of xylazine-ketamine has been reported [7] for induction and short-term anaesthetic maintenance in horses. In the USA the preferred induction technique is xylazine sedation (1.1 mg/kg, IV) followed by induction of anesthesia using ketamine (2.2 mg/kg, IV). Butorphanol (0.01-0.02 mg/kg, IV) or diazepam (0.03 mg/kg, IV) may be used for extra sedation and muscular relaxation. Most donkeys can be anaesthetized with these medications for about 15-20 minutes; however, these dosages are insufficient for miniature donkeys, even for a quick operation. They exhibit considerable muscle rigidity and excitatory qualities [3]. The purpose of this experiment was to compare the anesthetic efficacy of two different drug combinations in donkeys to determine which combination provides the optimal anesthesia with the least side effects after surgery.

Material and Methods

Administration set

For intravenous injection of drugs, disposable syringes (5, 10, and 20 mL) and intravenous (18-gauge needle) catheters (Lars Medicare, India) were used. 500 mL of normal saline and a micro-dripper were used for continuous infusion.

Experimental animals

The study was achieved in two steps: a pilot experiment was carried out on 18 trials to determine the suitable dosages for each combination, as 9 trials were done in each combination. Then the experiment was conducted on 10 local breed donkeys aged 5-8 years and weighting 95±5.9 kg. They were equally divided into two groups, five donkeys for each. All donkeys were clinically healthy and free from cardiovascular and respiratory tract diseases as they were quarantined for two weeks under observation and clinical examination before the experiment. The donkeys were housed in the Farm of the Faculty of Veterinary Medicine, South Valley University, Qena, and fed on green fodder and hay mixed with concentrates with the water freely accessed. The animals were kept for 2 weeks before the experiment for acclimatization. A thorough clinical examination was conducted before and routinely throughout the experiment.

Drugs

Xylazine hydrochloride

Xyla – ject® 23.3 mg/mL-1, ADWIA Co.10th of Ramadan city, Egypt.

Ketamine hydrochloride

Ketamine® 50 mg/ml, Sigma-Tec Pharmaceutical Industries, Egypt.

Diazepam

Neuril® 10 mg/2 ml, Memphis Co, Cairo, Egypt.

Propofol

Propofol-lipuro® 10 mg/ml was obtained from B. Braun Melsunges AG, Germany.

Nefopam hydrochloride

No Pain® 20 mg/ml, MUP-Egypt.

Methods of induction

Before anesthesia, the hair at the IV injection site was clipped, shaved, and aseptically prepared, and an 18-gauge needle was inserted at the jugular vein at a 45˚ angle and lowered to the longitudinal axis of the vein and advanced slightly under the effect of local anesthesia.

Combination (A)

Based on the pilot studies, the donkeys were premedicated with IV 1.1 mg/kg of xylazine, followed by IV induction of anesthesia with 2.2 mg/kg of ketamine HCl, and 0.1 mg/kg of diazepam within 5 minutes from premedication. The infusion of 2 mg/kg of propofol was administered 5 minutes following diazepam injection as continuous infusion in normal saline lasting for 19±2 minutes.

Combination (B)

Following the pilot studies, the donkeys were injected intramuscular (IM) with 0.4 mg/kg of nefopam HCL before induction of anesthesia by 30 minutes. Then the donkeys were premedicated IV by 1.1 mg/kg of xylazine followed by IV induction of anesthesia with 2.2 mg/kg of Ketamine HCl until reaching a desirable onset of anesthesia. The infusion of 2 mg/kg of propofol was administered 5 minutes following ketamine injection as a continuous infusion in normal saline for 19±2 minutes.

Monitoring the clinical effects of the anesthetic drugs

Following xylazine injection, the donkeys were inspected to describe the observed clinical signs scored according to *Ghurashi et al.* [8].

Level of sedation and degree of analgesia

Sedation and analgesic degree were scored according to Abdelbasset et al.[9] and Torad et al. [10], respectively.

Muscle relaxation

The quality of muscle relaxation scored from 1 to 3 scores [11].

Recovery

The nature of recovery was recorded and scored from 1= smooth as donkey able to stand at the first attempt, 2= fair as donkey remained calm and required two to three tries to stand, 3= poor, donkey remained calm and need to help to stand, and 4= very poor, Donkeys' excitement during recovery and should assisted and supported.

Anesthesia Phases:

The time of induction of anesthesia, analgesic phase, recovery, and total recovery were recorded and the donkeys were monitored for appearance of any side effects. Also, Anesthetic depth was assessed and evaluated by certain tests, including the presence or absence of reflex responses, in the anesthetized subject to stimuli, among these reflexes: tongue, eye, swallowing, pedal, and anal reflexes were noticed closely and reported immediately according to previously mentioned [12–14] and represented as the follows:

+++ Normal reflex

++- Sluggish reflex

+-- Very sluggish reflex

--- Abolished reflex

Physiological or vital parameters

Respiratory rate (breaths minutes-1), heart rate (beats/min), and rectal temperature (C^o) were studied before premedication and at 15, 30, 45, and 60 minutes intervals using standard methods [15].

Biochemical analysis

Blood samples (with and without anticoagulants) were collected from the donkeys, before premedication, after 15 minutes from induction of anesthesia with ketamine, and 30, 45, 60 minutes of anesthesia, and the last samples were collected after complete recovery to evaluate the effect of anesthetic drugs on blood picture, liver function tests (using reagent kits, M/S Transasia Biomed Pvt Ltd, India) by calorimetric determination of Alanine aminotransferase (ALT), and Aspartate aminotransferase (AST), and kidney function tests as serum creatinine and serum urea were determined by calorimetric methods [9,16]

Clinical observation

Donkeys were closely monitored throughout the experiment to record any signs related to the study protocols.

Statistical analysis

The obtained results were analyzed using SPSS version 16.0 Chicago, USA, with one-way analysis of variance (ANOVA), and the level of significance was set at $P < 0.05$.

Results

Evaluation of the anesthetic efficiency of the two drug combinations

Intravenous injection of Combination (A) xylazine hydrochloride (1.1mg/kg b.w.t), ketamine hydrochloride (2.2 mg/kg b.w.t), and diazepam (0.1 mg/kg b.w.t), respectively induced smooth induction within 46±3.8 seconds from the initiation of ketamine administration in all donkeys and anesthesia was maintained for 15.42±1.25 minutes, followed by a continuous maintenance dose of propofol infusion (2 mg/kg b.w.t) and provided anesthesia for 45.58±2.15 minutes. A period of 68±2.83 minutes was required for unaided standing in all donkeys as they were able to stand from sternal recumbency on the hindquarter for 2.6±1.3 minutes in 4 demonstrated donkeys with very good and smooth recovery in one donkey as shown in (Table 1).

Following xylazine-ketamine injection, all studied donkeys entered in deep sedation (very drowsy and unable to walk) with complete anesthesia in four donkeys and moderate anesthesia in one donkey. After diazepam injection, all studied animals fallen down. Complete anesthesia was evident in all donkeys after induction and during the maintenance period (Table 1).

Following premedication and induction of Combination (A), the body reflexes were greatly depressed (+--) and good muscle relaxation was demonstrated in all donkeys. Following diazepam induction, a deep plane of anesthesia was achieved with good degree of muscle relaxation with absence of the corneal reflex after propofol infusion for 20 minutes. After propofol injection, deep anesthesia was maintained with excellent muscle relaxation in four donkeys and good relaxation in one donkey (Table 1).

In combination (B), ketamine hydrochloride (2.2 mg/kg b.w.t) was sufficient to produce smooth induction within one minute from starting ketamine administration in three donkeys and providing mild sedation in another donkey while the fifth donkey showed, moderate sedation. Propofol administration by continuous infusion (2 mg/kg b.w.t) provided anesthesia for 31±2.85 minutes, with a duration of ketamine induction for 11±3.83 minutes. A period of 45.35±3.10 minutes was required for unaided standing with a smooth recovery (Table 2).

Following ketamine injection in Combination (B), all donkeys showed moderate to deep sedation (very drowsy, recumbent, and unable to walk) with complete anesthesia was encountered in four donkeys and a moderate anesthesia in the fifth donkey. After induction and during the maintenance period, complete anesthesia was demonstrated in all donkeys (Table 2).

Regarding the depth of anesthesia, pedal and palpebral reflexes were slightly depressed (+--) in all donkeys following administration of the drugs. Swallowing, anal, corneal and tongue reflexes were clearly sluggish in three donkeys. Good muscle relaxation was evident in all donkeys. After ketamine induction, moderate plane anesthesia was achieved with a good degree of muscle relaxation. Propofol infusion maintained deep anesthesia with very good

muscle relaxation in two donkeys and good relaxation in three donkeys (Table 2).

The respiratory rate in Combination (A) showed a significant decrease at the recorded time till reaching the base line by 50-60 minutes. The heart rate was significantly increased at 10-20 minutes and then gradually decreased. During the observation period, an insignificant decrease in body temperature was recorded (Table 3).

With regards to the heart rate In Combination (B), nefopam-xylazine-ketamine-propofol induced a slight decrease in heart rate after injection of propofol within normal saline compared with the recorded data after induction, with subsequent increase. Respiratory rate showed a significant decrease throughout the observation period. Concerning the changes in body temperature, an insignificant decrease after induction was noticed but after injection of propofol, a significant decrease was recorded during the observation period (Table 3).

In Combination (A), the serum urea and creatinine levels showed insignificant decrease after induction, while serum ALT showed non-significant decrease at the recorded time of induction. On the contrary, a significant change in AST levels was recorded at 15 min ($p=0.019$) (Table 4). In Combination (B), the serum urea showed non-significant changes at any recorded time, but the creatinine levels ($p=0.001$) and serum ALT ($p=0.026$) showed significant increase at 45 minutes. AST activities showed insignificant decrease along the observation periods ($p=0.015$) (Table 4).

On the other hand, the Combination (A) showed insignificant decrease in RBCs and HB values after induction and following propofol infusion, while WBCs parameters showed a slight decrease up to 60 minutes. Throughout the whole experimental period, the obtained results showed a significant increase in the total lymphocytes at 15 minutes, while monocyte count significantly decreased at 15 minutes, with an increase in blood platelets was recorded throughout the observation period as shown in Table (4). While the Combination (B) showed an increase in RBCs, WBCs, and HB values which were recorded after induction and increased at 30 and 60 minutes following propofol injection (Table 5). Regarding the effect of Combination (B) on leukogram, the obtained results revealed a significant increase in lymphocytes at 60 minutes after induction ($p=0.049$). On the contrary, monocyte count significantly decreased at 15 minutes ($p=0.01$) (Table 5).

Clinical observation

During the recovery period in Combination (A), all donkeys smoothly recovered and they were able to stand for a few minutes post recovery without assuming sternal recumbency. One donkey fallen down and exhibited complete recumbency with rigid, twisted neck and extended limbs, while another donkey defecated immediately after recovery. Slight lock jaw was observed in all donkeys with protrusion of the tongue with absent tongue and swallowing reflexes for more than 35±5.7 minutes. Deep respiration (apnea) with snoring voice occurred in one of the experimental animals. In one donkey, the quality of recovery was excellent and very good in four donkeys. Lacrimation was observed during anesthetic time in all donkeys.

In Combination (B), all donkeys showed no signs of pain during injection due to analgesic effect of nefopam. During the recovery period, one donkey urinated upon standing from recumbency. One donkey exhibited slight paddling of fore limb during the induction time. All donkeys recovered smoothly with lateral and sternal position from 6 to 10 minutes. The voluntary swallowing returned during recovery, with sternal recumbency was encountered in three donkeys.

Discussion

In Combination (A) following diazepam induction, a deep plane of anesthesia was obtained with good muscle relaxation. Deep anesthesia was sustained with good muscle relaxation was observed following propofol injection. These results are supported by Hall [17] who stated that diazepam prolongs the action of other anesthetic agents.

On the other hand, it was reported that diazepam has little impact on respiration, heart rate, and rectal temperature while providing complete muscle relaxation [18,19]. In this respect, Abakar et al. [4] suggested that sedative dose of xylazine followed by diazepam and ketamine can produce satisfactory short duration anesthesia in donkeys. After diazepam, injection all studied donkeys recumbent [8].

Moreover, Abass et al. [20] reported that diazepam/ketamine anesthesia induction followed by xylazine propofol infusion (XKDP) is enough to produce a high quality surgical anesthetic plane with cardiopulmonary stability profound analgesic effect in donkeys. Also, Abakar et al. [4] reported that the quality of anesthesia induced in donkeys using various combinations of diazepam with xylazine-ketamine provide satisfactory anesthesia under field conditions.

Meanwhile, Abakar et al. [4] recorded that, induction of diazepam with ketamine in donkeys aims to minimize the risk of cardiopulmonary depression and extend the duration of anesthesia with a smooth recovery, this findings agreed with Portella et al. [21] and Haskins et al. [22] as they observed that, significant decrease in respiratory rates was recorded time till reach the baseline at 50-60 minutes, and significant increase in the heart rates was recorded at 10-20 minutes, which then decreased

at any time till the base line. Also, these results agreed with Fayyaz et al. [23] they observed that, a wider safety margin which may exists after ketamine-diazepam induction without cardiopulmonary effects. However, during the observation periods following injection of propofol, there was minor reduction in body temperature which agreed with that reported by Muhammad et al. [24].

In donkeys received Combination (A), serum biochemical parameters showed insignificant changes except a significant change in AST activity levels were recorded at 15 minutes post induction. These finding agreed with Nyblom et al. [25] and Abdelnasser et al. [26]. Similar results were obtained by Bani Ismail et al. [27] who found no significant differences in serum ALT, AST, Urea, and creatinine values before and during ketamine-xylazine-diazepam anesthesia in sheep and goats.

In addition, the haematological results of RBCs, and HB values after induction and following propofol administration were decreased; these results agreed with Atalan et al. [28] who recorded a significant decrease in haematocrit percentage in dogs after xylazine – ketamine anesthesia. On the other hand, TLC increased due to enhanced blood flow through the microcirculation and redistribution of white blood cells which considered responsible for this increase after induction of ketamine as recorded in previous studies [34] [35].

Combination (A) showed slight lock jaw which was observed in all studied donkeys with protrusion of the tongue, similar results were obtained by Muhammad et al. [24] who stated that, the administration of propofol and ketamine intravenously induced rapid mandibular tone reflex which remained for long time, one of the studied animals fallen down and in which the animal exhibit a complete recumbence with rigid and twisted neck with extended limbs and lacrimation was observed during the anesthetic time in all studied animals. All these clinical observations agreed with Abdelnasser et al. [26]. An excellent smooth recovery was encountered in all donkeys subjected to Combination (B).

In case of combination (B), following nefopam and xylazine premedication, all the studied donkeys showed moderate to deep sedation with complete analgesia. Very good muscle relaxation was evident in all donkeys with a smooth rapid recovery being observed in propofol administered animals. A fact which coincides with VanNatta and Rex [31] and Short and Bufalari [32]. These results were in accordance with that observed in our study in particular with combination as the administration of ketamine with propofol counteracts the respiratory depression, which was seen when propofol used alone [33].

In addition, mentioned that propofol reduces the cardiac output and the total peripheral resistance inspite of unchanged or increased heart rate. While Muhammad et al. [24] added that, administration of ketamine in combination with propofol counteract the respiratory depression, which was seen when propofol was used alone at higher doses. Also, Al-hussainy et al. [34] mentioned that nefopam has been showing no significant circulatory or respiratory depression.

On the other hand, Topal et al. [35] reported that, injected animals with the xylazine- propofol, showed distinct increase of heart rate and the marked decrease of respiratory rate which were observed with using propofol as a general anaesthetic in equine.

Concerning the body temperature, there was a slight decrease in body temperature after induction in all animals but after injection of propofol, a significant decrease was recorded during the observation periods. Meanwhile, it as was reported that, α2 agonists was better for maintenance of body temperature which may be attributed to its peripheral vasoconstriction action along with central redistribution of blood with subsequent reduction in the cutaneous temperature [36].

The haematological results in Combination (B) showed increased in RBCs, WBCs, and HB values after induction and following propofol administration; these results disagreed with Atalan et al. [28] who reported significant decrease in haematocrit percentage in dogs subjected to xylazine – ketamine anesthesia.

On the other hand, TLC increased due to the increased blood flow through the microcirculation and redistribution of white blood cells which considered responsible for this increase after induction of ketamine as reported in other studies [29,30] except monocyte count significantly decreased only at 15 minutes. Serum biochemical assays indicated a significant increase in serum ALT activities and creatinine throughout the recorded periods, and this agreed with Short and Bufalari [32] who mentioned that propofol was rapidly metabolized with minimal body accumulation which considered suitable factor for maintenance of anesthesia. Similar results were reported by Sano et al. [37] who said that propofol is a drug of choice essential for induction and maintenance of general anesthesia in small animals.

Serum urea levels showed no significant changes at any recorded times. These results agreed with Fusellier et al. [38] who reported that, there was no change in GFR during anesthetic episodes of propofol (6 mg /kg).

Ketamine is a dissociative anaesthetic agent, when used in combination with xylazine or diazepam

for induction of anesthesia produces good degree of muscle relaxation and good score of sedation and analgesia with a relatively prolonged anesthetic stage. Moreover, ketamine prevents respiratory depression which occurred when propofol was given alone [26,39]**.**

Conclusion

Depends upon the species and breed of animal, nature of the surgical operation and its duration, susceptibility of the patient to the action of anesthetic drug and health status of the animal to be anesthetized. In this study, Combination (A) comprising xylazine / diazepam/ ketamine and propofol was the regimen of choice due to its enhanced anesthetic efficacy, and mitigation of depressant effects on vital, haematological, and biochemical parameters. Moreover, they considered of suitable economic value for performing major surgical interferences. Combination (B) involving nefopam/ xylazine / ketamine and propofol, is suitable for pain reduction as result of a short surgical interference.

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Declaration of Conflict of Interest

The authors declare no competing interests.

Ethical of approval

This experiment was carried out after approval of the animal ethics committee of the Faculty of Veterinary Medicine, South Valley University, Qena (Approval No, VM/SVU/23(2)-25).

TABLE 1. Anesthetic efficiency of the proposed combinations

Group	Onset of anesthesia (seconds)	Quality of induction (min)	Duration of induction (min)	Duration of maintenance (min)
Combination (A)	46± 3.8	Smooth *	15.42 ± 1.25	45.58 ±2.15
Combination (B)	66 ±6.53	Smooth	11 ± 3.83	31 ± 1.85

Values are means ± SE *p<.05.

TABLE 2. Influences of administration of the proposed drug combinations on sedation, analgesia, body reflexes and muscles

Group	Stage		Analgesia grade	Body reflexes				Corneal reflex	Muscle relaxation
				Palpebral	Pedal	Anal	Swallowing		
Combination (A)	Zero time		0	+++	+++	+++	+++	+++	-----
	After induction	15 min	2-3	+--	+--	+--	+--	++-	2
		30 min	3	---	---	---	---	---	2-1
		45 min	3	---	---	---	---	---	1
		60 min	3	---	---	---	+--	---	2-1
	After recovery		0	+++	+++	++-	+++	+++	-----
Combination (B)	Zero time		0	+++	+++	+++	+++	+++	-----
	After induction	15 min	2-3	+--	+--	+--	+--	+--	2
		30 min	3	---	---	---	---	---	2-1
		45 min	3	---	---	---	---	---	2-1
		60 min	2	+++	++-	++-	+++	++-	2
	After recovery		0-1	+++	+++	+++	+++	+++	----

TABLE 3. Changes in heart rate, respiratory rate and body temperature following administration of the anesthetic combinations

Group	Stage		Heart rate	Respiratory rate	Body temperature
Combination (A)	Zero time		48.33 ± 1.10	27.33 ± 1.10	38.69 ± 0.26
	After induction	15 min	53.67 ± 1.58*	24 ± 0.36*	38.35 ± 0.12
		30 min	52 ± 0.33	25 ± 0.90	37.45 ± 0.10
		45 min	51 ± 0.58	26 ± 0.95	37.65 ± 0.15
		60 min	50 ± 0.58	24.17 ± 1.05	37.56 ± 0.12
	After recovery		48 ± 1.58	26.17 ± 2.05	37.66 ± 0.12
Combination (B)	Zero time		48 ± 0.65	26.90 ±0.45	38.49 ± 0.44
	After induction	15 min	47.35 ± 1.89	23 ± 1.80*	37.23 ± 0.23
		30 min	47 ± 3.22	23.23 ± 1.18	37.32 ± 0.37
		45 min	46 ± 1.45	24.05 ± 0.90	37.67 ± 0.18
		60 min	47 ± 0.52	23.65 ± 0.40	37.77 ± 0.11
	After recovery		48.02 ± 1.50	25.86 ± 0.40	38.05 ± 0.45

TABLE 4. Blood picture before and after administration of combination (A)

Time		RBcs (x10-^{6}/ µ l)	HB (gm/ dl)	WBcs (x10-^{3}/ µ l)	Lymphocyte (x10-^{3}/ µ l)	Monocyte (x10-^{3}/ µ l)	Platelets (x10-^{3}/µ l)
Zero time		4.84±0.35	9.64 ±0.68	10.32 ±0.66	56 ±1.33	27 ±0.02	125.15 ±0.25
After induction	15min	4.7±0.24	9.58 ±0.26	9.60 ±0.17	63±1.02*	20 ± 0.01*	120.50 ±0.35
	30 min	4.64±0.48	9.33 ± 0.47	9.66 ± 0.42	59±0.25	22 ± 0.03	127.06 ±0.97
	45 min	4.73±0.31	9.48 ± 0.88	9.97 ± 0.27	58 ± 0.32	23 ± 0.01	130.41 ±0.53
	60 min	4.78±0.88	9.53 ± 0.36	9.98 ± 0.45	57 ± 0.35	23 ± 0.72	128.95 ±0.57
After recovery		4.80±0.38	9.55 ± 0.66	10.02 ±0.56	56±0.25	24 ± 0.88	125.95 ±0.57

TABLE 5. Blood picture before and after administration of combination (B)

Time		RBcs (x10-^{6}/ µ l)	HB (gm/ dl)	WBcs (x10-^{3}/ µ l)	Lymphocyte (x10^{-3}/ µ l)	Monocyte (x10^{-3}/ µ l)	Platelets (x10^{-3}/µ l)
Zero time		4.55 ±0.50	8.94 ± 0.09	13.48 ± 0.17	52.23 ± 1.45	20.03 ± 0.03	133.67 ±0.89
After induction	15 min	4.53±. 07	8.9 ± 0.20	11.34 ± 0.19	52.21 ±0.24	17.22 ± 0.02*	128.28±0.69
	30 min	4.57±0.11	8.85 ± 0.11	11.10 ± 0.45	55.41±0.78	19.35 ± 0.33	130.35±0.31
	45 min	4.88±0.22	8.89 ± 0.11	12.54 ± 0.54	56.55 ± 0.05	19.04 ± 0.01	130.55±1.61
	60 min	4.76 ± 0.15	9.17 ± 0.21	12.26 ± 0.62	60.76 ± 0.21 *	19.56 ± 0.02	132.69±0.58
After recovery		4.60± 0.13	8.89 ± 0.04	13.55 ± 0.05	53.15 ± 0.01	20.23 ± 0.33	133.17 ±1.49

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دراسة تجريبية مقارنة على تركيبتين من المخدر الوريدي في سلالات الحمير المحلية

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الملخص

تهدف هذه الدراسة إلى دراسة مجموعتين من مجموعات أدوية التخدير الوريدي الكلي(TIVA) من خلال مقارنة تأثيرات التخدير والتغيرات البيوكيميائية والملاحظات السريرية. تم تقسيم 10 حمير بعمر 5-8 سنوات ووزن 95 ± 5.9 كجم إلى مجموعتين كل مجموعة مكونة من 5 حيوانات. التركيبة (أ) المكونة من زيلازين هيدروكلوريد 1.1 ملجم/كجم، كيتامين هيدروكلوريد 2.2 ملجم/كجم، ديازيبام 0.1 ملجم/كجم بالإضافة إلى التسريب الوريدي المستمر لـ 2 ملجم/كجم بروبوفول، التركيبة (ب) المكونة من نيفوبام 0.4 ملجم/كجم، زيلازين 1.1 ملغم / كغم، 2.2 ملغم / كغم من الكيتامين بالإضافة إلى التسريب الوريدي المستمر لـ 2 ملغم / كغم من البروبوفول. تم تسجيل بداية ومدة تحريض التخدير، وفترة الشفاء. علاوة على ذلك، تم تحليل معدل ضربات القلب ومعدل التنفس ودرجة حرارة الجسم وصورة الدم والكيمياء الحيوية في الدم قبل وبعد تناول الأنظمة المقترحة. أظهر إعطاء التركيبة (أ) بداية سريعة للتحريض خلال 6 3.8 ثانية، وتم الحفاظ على تأثيرها المخدر لمدة 45 دقيقة تقريبًا بعد ضخ البروبوفول المستمر في محلول ملحي عادي لمدة 19 ± 2 دقيقة، يليه انتعاش سلس جدًا خلال 68 دقيقة تقريبًا بعد تحريض التخدير. في المقابل، أظهرت المجموعة (ب) تحريضًا أقل كفاءة، حيث كانت هناك حاجة إلى ما يقرب من 11 دقيقة للتحريض الذي تم الحفاظ عليه لمدة 31 دقيقة بعد ضخ البروبوفول المستمر لمدة 19 ± 2 دقيقة وتلاه انتعاش سلس خلال 45 دقيقة. يمكن أن نستنتج أن المجموعة (أ) تعتبر ذات قيمة اقتصادية مناسبة لإجراء التدخلات الجراحية الكبرى. بينما التركيبة (ب) مناسبة لتخفيف الألم والتداخلات الجراحية القصيرة.

الكلمات الدالة: الحمير التخدير الوريدي. الكيتامين. البروبوفول. زيلازين.