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Comparison of Xylazine-Ketamine, Diazepam-Ketamine, and Diazepam-Thiopental Combinations in Goats Undergoing Rumentomy

Safaa Amin[1], Abbas Sobair[1], Awad Rizk[2] and Mohamed Salem[2,3]

[1]*Department of Surgery and Anesthesia, Faculty of Veterinary Medicine, Khartoum University, Khartoum, Sudan.*
[2]*Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Mansoura University, 35516 Mansoura, Egypt.*
[3]*Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid 22110, Jordan.*

Abstract

GENERAL ANESTHESIA can be induced in goats using the same drugs commonly used in other species. These induction agents include thiopentone, propofol and ketamine, which can be administered with or without premedication. This study evaluated the effect of three injectable anesthetic protocols in Nubian goats undergoing rumentomy. This study was performed on 32 adult Nubian goats divided into 4 groups. *Group 1(XK):* Animals in this group were premedicated with xylazine HCl at a dose of 0.05 mg/kg BW and Ketamine HCl at a dose of 4mg/kg BW. *Group2 (DK):* Animals in this group were premedicated with diazepam at a dose of 0.5 mg/kg BW, and Ketamine HCl at a dose of 4mg/kg BW. *Group 3(DT):* Animals in this group were premedicated with diazepam at a dose of 0.5 mg/kg BW, and thiopentone sodium at a dose of 10 mg/kg BW. *Group 4 (Control group):* All animals in this group received all three aforementioned anesthetic protocols every 15 days intervals between two successive anesthetic treatments. Measurements of heart rate (HR), respiratory rate (RR), rectal temperature (RT), and length of the anesthetic phase, hemoglobin (Hb), packed cell volume (PCV), total protein (TP), blood glucose level, were made in controls, during surgery, and four weeks after the procedure at regular predetermined intervals. Both during the procedure and four weeks afterward, group XK experienced a significant ($P < 0.05$) reduction in HR and RR. The XK group experienced a substantial decrease ($P < 0.05$) in plasma TP during surgery, although the DK and DT groups also experienced a significant decrease in plasma TP four weeks after surgery. During the procedure, the DT group's plasma glucose level significantly increased. The DT group experienced a statistically significant increase in the length of the anesthetic phase. In conclusion, the combination of diazepam and thiopental generated safer, deeper and longer anesthesia during rumentomy in goats.

Keywords: Xylazine, Diazepam, Ketamine, Thiopental, Rumentomy, Goat.

Introduction

An increasing number of ruminal foreign bodies were found in farm animals such as cows, buffalo, sheep, and goats [1, 2]. Goats that are allowed to roam freely are particularly vulnerable to ruminal foreign objects in areas contaminated by industrial waste, including plastic bags, in addition to ropes, hair, wool, and metals **[3].** When these foreign, indigestible elements build up, they mix in the rumen, creating an indigestible hard mass that can induce aberrant physiology and frequently result in death [4]. The goal of rumentomy, which involves removing ruminal foreign bodies from goats, is often to save the lives of these frequently fatal animals [3, 5, 6].

Goats may undergo Laparo-rumenotomy under local anesthesia with physical restraint, or, in rare cases, under general anesthesia. In the latter case, special attention must be given to the selection of a safe and appropriate anesthetic protocol in order to prevent the various complications brought on by the presence of foreign bodies on the normal physiology

*Corresponding authors: Awad Rizk, E-mail: awadrizk2010@mans.edu.eg, Tel.: 01099513339
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and the patient's mortality [7]. Goats that are put under general anesthesia typically have three main problems: tympany, excessive salivation, and reflux of rumen contents [7-9].

Xylazine hydrochloride is frequently used in rum inant clinical practice due to its dose-dependent analgesia, sedative, and muscle relaxant properties contents of the rumen [10-14]. Its application in ruminants is linked to rumen stasis, bradycardia in clinical practice, extended induction and recovery, moderate to severe cardiopulmonary depression, ineffectiveness in agitated animals, and higher dosages [15, 16]. Ketamine, a dissociative anesthetic derived from phencyclidine, is administered to animals and humans by IV and IM routes [17]. It is a dissociative anesthetic agent which has major advantages in comparison with other general anesthetic agents because it mildly stimulates cardiovascular function via sympathomimetic effects and also provides analgesia as already stated [18]. Sheep and goats can be put to sleep with ketamine without worrying about having convulsions. It has poor muscle relaxation, however sedatives such as xylazine or diazepam can help [19-21].

Diazepam is a potent hypnotic sedative that causes muscle relaxation [22, 23]. Diazepam is a popular benzodiazepine derivative for use in different species of animals. The drug has a dose-dependent effect and depending on the dose, the drug is a potent tranquillizer in humans and many animal species. The drug was reported to have minimal effect on the respiratory system, heart rate, and rectal temperature [23].combination of diazepam and ketamine with or without xylazine is frequently used to induce general anesthesia in small ruminants [24].

Thiopental is an ultra-short acting barbiturate that provides smooth and rapid induction. Thiopentone sodium can be used in different dose levels to serve different functions like induction or maintenance of anesthesia. The different effects of Thiopentone sodium on the patient like induction time, duration of anesthesia and total recovery time are governed by many factors including the dose, concentration and speed of injection [25]. General anesthesia which induced with the use of thiopental must be performed in conjunction with medications like xylazine and/or diazepam to enhance analgesia and muscle relaxation because of its poor analgesic and muscle relaxant qualities [26-28]. Due to the seriousness of ruminal foreign bodies in goats, their negative effects on the overall health of the animal, and the paucity of information on the subject, the primary goals of this study were to evaluate the effect of the selected three general anesthetic protocols (XK, DK and DT) during rumentomy and at 4 weeks post-surgery through measurement of some physiological, hematological and biochemical variables as well as the duration of anesthetic phase in Nubian goats.

Material and Methods

Animals, housing, and feeding

For this investigation, a total of 32 adult Nubian goats weighing between 15 and 35 kg BW and 2-4 years old were used. Eight animals were clinically healthy while the other twenty-four animals had ruminal foreign bodies.. The animals were given a general inspection both before and following the experiment, as well as regularly during the investigation. The Mansoura Veterinary Teaching Hospital served as the study's location. This study adhered to the ethical standards and guidelines for the treatment and use of experimental animals as approved by the Scientific Research Ethical Committee, Faculty of Veterinary Medicine, Mansoura University, and Egypt Code: VM.R.24.10.180

Experimental design

Animals were divided into four treatment groups, each with eight animals, at random. Rumentomy was done on the animals in groups 1, 2, and 3 who had ruminal foreign bodies. Group 4's animals, on the other hand, were controlled and were clinically healthy.

Group 1(XK): Animals in this group were premedicated with xylazine HCl (Xylazine 2%, CEVA, CEVA TIERGESUNDHEIT GmbH, Kanzlerstr, Germany) at a dose of 0.05 mg/kg BW, 10 minutes later, they received Ketamine HCl (Ketamax-50, Troikaa Pharmaceuticals Ltd, Gujarat, India) at a dose of 4mg/kg BW.

Group2 (DK): Animals in this group were premedicated with diazepam (Rompam, LTD, Bangkok, Thailand) at a dose of 0.5 mg/kg BW, 10 minutes later; they received Ketamine HCl at a dose of 4mg/kg BW.

Group 3(DT): Animals in this group were premedicated with diazepam at a dose of 0.5 mg/kg BW, 10 minutes later; they received thiopentone sodium (Thiosol, 2.5%, Damji Samji Industrial Complex, Mumbai, India) at a dose of 10 mg/kg BW. In all animals, the drugs were administrated intravenously through the jugular vein.

Group 4 (Control group): All animals in this group received all three aforementioned anesthetic protocols every 15 days intervals between two successive anesthetic treatments.

Measurements

RR (breaths/min) was calculated by counting thoracic excursions, whereas HR (beats/min) was recorded using a stethoscope. A digital thermometer was used to determine the RT (C°). 5 ml of blood was collected from jugular vein before and after the

anesthesia. With the aid of an electronic cell counter (ABC, vet hematology analyzer, ABX diagnostics, France), hematological analysis (Hb g/dl and PCV%) was carried out. Samples of heparinized venous blood were centrifuged at 1.500X g for 10 minutes right away. Until it was examined for glucose (GOD-PAP method) and TP (Biuret method) using commercially available kits and reagents by the manufacturer's

Anesthetic phase: the period during which the animal showed no sign of consciousness with loss of reflexes and negative response to the pain stimuli was evaluated according to [22]. Depth of anesthesia during the operation was recorded in short-term intervals by monitoring the body reflexes.

Surgical intervention (Rumentomy)

In the first three groups, rumentomy was performed according to **[29, 30]** for removal of ruminal foreign bodies. During the first week following surgery, the goats had surgery and were administered antibiotics (pen&strep, Norbrook, North Ireland) and non-steroidal anti-inflammatory drugs (Meloxicam, 0.5 mg/kg IV; Metacam, Boehringer Ingelheim, Germany). The animals undergoing surgery received fluid therapy up to the third day following the procedure. After that, they were gradually fed green food for a minimum of one week

Study protocol

At baseline (before the injection of pre-anesthetic medication), at 10 minutes following premedication, and subsequently at 10 and 30 minutes following the induction of anesthesia, cardiorespiratory (HR, RR, and RT) parameters were assessed. Both before and after anesthesia, hematological (Hb and PCV) and biochemical (TP and blood glucose) data were evaluated. During the four weeks after surgery, as well as during the procedure, all variables were assessed in the controls.

Statistical analysis

The data were presented as the mean ± standard deviation for every group of eight goats. Analysis of variance was used to compare the means (ANOVA). In every instance, a probability value of $P \leq 0.05$, which is less than or equal to 0.05, was deemed significant. to identify the categories that differ. To compare the variations between the experimental groups, Dennett's test was employed.

Results

Effect of XK-DK-DT anesthetic protocols on cardiopulmonary parameters

The mean average of HR was significantly ($P \leq 0.05$) decreased at 10 min after premedication with xylazine and returned to normal value from 10 min after administration of ketamine during surgery and at 4 weeks post-surgery (Table 1). In DK treated group, there was a significant ($P \leq 0.05$) decrease in HR at 10 min after injection of diazepam and showed a little increase after the administration of ketamine then returned to normal values until the end of the operation. While at 4 weeks after surgery, it showed a non-significant change in DK-treated animals (Table 1). On the other hand, in DT treated group, HR was significantly ($P \leq 0.05$) decreased at 10 minutes after premedication with diazepam and elevated immediately after injection of thiopentone until the end of the operation (Table 1). In controls, the mean HR values were significantly ($P \leq 0.05$) decreased for 10 min after premedication in XK treated group during surgery, after that, it showed a significant ($P \leq 0.05$) increased at 10 and 30min after induction of anesthesia with ketamine. While it showed a significant ($P \leq 0.05$) increase in DT-treated animals when compared to baseline values (Table 1).

During surgical intervention, the mean average of RR was significantly ($P \leq 0.05$) decreased at 10 min after injection of xylazine and returned to normal values immediately after induction with ketamine, while it showed a non-significant decrease at 4 weeks post-surgery (Table 1). In DK-treated animals, RR showed no significant change after premedication with diazepam, or induction either with ketamine or thiopentone during surgery and 4 weeks post-surgery (Table 1). While it showed a significant decrease ($P \leq 0.05$) at 30 min after thiopentone administration in DT-treated animals at 4 weeks post-surgery (Table 1). In controls, the mean RR was significantly ($P \leq 0.05$) decreased 10 minutes after premedication with xylazine and diazepam, and during induction of anesthesia either with ketamine or thiopentone in all treated animals compared to baseline values (Table 1).

The mean RT showed no significant change in all treated animals of all groups during the rumentomy procedure and at 4 weeks post-surgery while it showed a significant decrease at 30 min in DK-treated animals at 4 weeks post-surgery and controls compared to baseline values (Table 1).

Effect of the XK-DK-DT anesthetic protocols on hematological and biochemical variables

There was a significant decrease ($P \leq 0.05$) in plasma TP value in animals of XK group compared to DK and DT groups during the surgical intervention while it showed a significant decrease ($P \leq 0.05$) at 4weeks post-surgery in animals received DK and DT (Table 2). The mean plasma glucose level showed a significant increase (70.1±2.5; $P \leq 0.05$) in animal's received DT compared to XK group (38.5±12.1) and DK group (42.8±12.8) respectively, during the surgical intervention (Table 2).

The mean average of PCV values showed a significant ($P \leq 0.05$) increase after treatment with DK in control group compared to XK and DT treated group. While there were no significant changes in the mean Hb value in all animals of all treated groups (Table 2).

Effect of the XK-DK-DT anesthetic protocols on the anesthetic phase

There was no significant change in the duration of the anesthetic phase between the selected anesthetic protocols during the rumentomy procedure. There was a significant increase ($P \leq 0.05$) in the duration of the anesthetic phase in the DT group compared to the other two anesthetic protocols XK and DK in controls and at 4 weeks post-surgery (Table 3).

Discussion

Due to the sophistication and high cost of inhalation anesthesia, the use of total intravenous anesthesia to perform rumentomy in goats for the removal of ruminal foreign bodies is strongly recommended in our locality. Thus, this study aimed to assess the safety and effectiveness of three different intravenous anesthetic procedures in goats having rumentomy.

In the present study, the mean HR in XK-treated animals showed a significant decrease during surgery, at 4 weeks after surgery, and in controls. Similar results were recorded in goats [14], sheep [31, 32], horses [33-35] and in calves [36]. In contrast, there was no significant change in the HR after xylazine-ketamine administration in female desert goats [37]. The lower HR in this anesthetic regimen may have been caused by the main cardiovascular side effects of alpha2-adrenoreceptor agonist [22]. However, ketamine may increase the HR through increased sympathetic activity and decreased vagal tone. Due to vasoconstriction from peripheral postsynaptic adrenoreceptors, decreased heart rate may be explained by the sinus carotid baroreceptor reflex in response to initial hypertension [15].

The mean HR returned almost gradually to normal value after ketamine administration at a dose of 4mg/kg during surgery and in the controls while at 4 weeks post-surgery it showed a significant decrease. A similar observation was recorded in sheep by [38] who reported the restoration of the HR to normal value immediately after injection of ketamine HCL at the dose rate of 22 mg/kg in ewes on early stage of pregnancy [38]. According to a prior publication in goats, the DT regimen used in this investigation resulted in a non-significant drop in HR during surgical intervention [39]. Four weeks after rumentomy, goats' blood pressure significantly increased when given a diazepam injection, as did the controls.

In the present study, the mean average of HR was increased after thiopental administration. This result is consistent with that observed in sheep where thiopental administration increased HR and arterial blood pressure by approximately 50 % [40]. Another study showed a 33% increase in HR with decreased cardiac output was observed in sheep injected with thiopental [39]. The increase in HR was maintained from 0.5 min post-injection onwards (for more than 30 min). The baroreflex can cause an initial increase in HR but cannot sustain it throughout the experimental period. Pentobarbital administration also increased HR in dogs [22].

When DK was used, there were no changes in HR during rumentomy or in the controls following ketamine or diazepam injections. After receiving a diazepam injection, the control group's heart rate increased for ten minutes, and it then significantly increased following ketamine delivery. This finding was supported by Taylor (1991) who stated that the sympathomimetic action of ketamine HCL increased blood pressure and heart rate [41]. Induction of anesthesia using these anesthetic protocols 4 weeks after surgery resulted in a non-significant change in the HR.

In this investigation, XK treatment during rumentomy and in controls resulted in a considerable reduction in RR. The moment ketamine was used to induce anesthesia, the RR went back to normal levels. RR decreases when alpha 2-agonists are used as sedatives; the length of this effect varies based on the species and dosage. This decrease is brought on by a CNS depression brought on by stimulation of alpha 2-adrenoreceptors [42]. A decrease in RR was noted following xylazine administration in cows [15, 43] and sheep [22].

The mean RR in controls decreased significantly when the DT anesthetic procedure was used, but during rumentomy, the decrease was not statistically significant. Muir et al.'s (1982) findings, which showed that diazepam at clinical dosages only slightly reduced respiratory depression in horses and somewhat decreased respiration at high intravenous doses, corroborate this conclusion [44]. It was reported that thiopental sodium has potent respiratory depressant effects [45]. The incidence of severe respiratory depression as a consequence of using pentobarbital was described [46-48]. Similarly, thiopental administration decreased RR in sheep [39].

When the DK anesthetic protocol was used, the RR in the control group significantly decreased, but there were no significant changes during rumentomy or four weeks after surgery. Even though ketamine was said to be a subpar muscle relaxant [22], usage of diazepam may be the cause of muscle relaxation observed during surgery performed, since diazepam is reported to be a good muscle relaxant [22].

Literature suggests that xylazine and ketamine can both cause hypothermia [49]. A notable drop in RT was seen in our study 30 minutes after anesthetic induction. The reduction in rectal temperature is consistent with the findings of Afshar et al. (2005), who observed a noteworthy drop in rectal temperature in goats 30 to 60 minutes following the induction of anesthesia with xylazine-ketamine [32].

RT changed non-significantly as a result of the use of DT both during the surgical procedure and four weeks after the procedure. However, there was a non-significant decline in the controls. Khan (2006) noted a comparable outcome in buffaloes following the administration of thiopentone sodium [27]. On the other hand, Ghurashi (2008) observed a noteworthy rise in RT in goats immediately following the administration of thiopentone sodium to induce anesthesia [25].

After the foreign entities were surgically removed, the mean average of Hb and PCV did not significantly alter when the anesthetic protocols XK and DT were used. Ghurashi et al. (2009) revealed a noteworthy rise in Hb concentration in goats using identical methods, indicating a divergent outcome [4] and a significant decrease of PCV in sheep [50]. However, DK's mean blood HB and PCV concentrations showed a considerable drop. This decrease could be explained by fluid moving from the extravascular to the intravascular compartment to maintain a normal cardiac output [49, 51].

The mean plasma TP level in the XK group of animals in this study was significantly lower than in the other groups during the surgical intervention, whereas the DK and DT-treated groups showed a significantly lower level four weeks after surgery. This difference in level could be explained by the fluid's incompatibility shift [52]. Another possibility for the cause of the drop in total protein could have been a fluid shift from the extravascular compartment to the intravascular area [53].

During surgical intervention, the mean plasma glucose level in animals receiving DT increased significantly (70.1±2.5) in comparison to the XK group (38.5±12.1) and the DK group (42.8±12.8). An increase in the release of corticosteroids or adrenaline has been linked to this hyperglycemia. Furthermore, an enhanced synthesis of glucose in the liver and the suppression of insulin release via activating alpha-2 adrenoreceptors in pancreatic B cells may be responsible for this impact [49, 54].

The anesthetic phase duration increased significantly in the group receiving DT treatment. These animals' prolonged anesthesia duration may have been attained by the medications' synergistic effects. Interestingly, when compared to other anesthetic protocols, the combination of diazepam and thiopental induced deeper and longer anesthesia during surgical intervention in goats.

Conclusion

It was determined that goat rumentomy can be performed safely using the chosen anesthetic procedures. The cardiorespiratory depressant effects of xylazine and diazepam can be counteracted by inducing anesthesia with ketamine. Compared to previous anesthetic regimens, the combination of diazepam and thiopental generated deeper and longer anesthesia during rumentomy in goats, according to the study's findings.

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Declaration of Conflict of Interest

The authors have disclosed that they do not hold any conflicts of interest related to the publication of this article

Ethical of approval

This study adhered to the ethical standards and guidelines for the treatment and use of experimental animals as approved by the Scientific Research Ethical Committee, Faculty of Veterinary Medicine, Mansoura University, and Egypt Code: VM.R.24.10.180

TABLE 1. HR, RR, and RT variables (mean±SD) in Nubian goats following XK, DK, and DT anesthetic protocols were measured at baseline, 10 min after premedication, and at 10& 30 min after induction in controls, during surgery, and at 4 weeks post-surgery.

	Controls				During surgery				At 4 weeks post-surgery			
	BL	+10min premed.	+10min Induction	+30min Induction	BL	+10min premed.	+10min Induction	+30min Induction	BL	+10min premed.	+10min Induction	+30min Induction
Heart rate (beat/min)												
XK	81.1±33.6	**49±10.8^{a}**	63±12.6^{a}	58.8±10^{a}	62.2±9.1	**54.8±23.9^{a}**	**52±8.3^{a}**	68±14.9	87±28.7	**54.8±19.4**	**55.4±14.1^{a}**	**55.4±12**
DK	66.8±11.9	75±17.1^{b}	**99.4±19^{b}**	**96.5±17^{b}**	78.5±27	87.4±17.9^{b}	88±26^{b}	80.2±14	88±18.7	88.2±21.4	94.5±22^{b}	89.4±20
DT	68.5±12.9	**96±30^{b}**	**100.8±7^{b}**	**96.2±7.9^{b}**	68±22.8	52.5±24.2^{a}	80±14.6^{b}	80.8±19.5	64.8±6.8	84.7±28	84.4±10^{a,b}	85.5±18.6
Respiratory rate (breath/min)												
XK	25.7±11.2	**14.8±5.5**	**19.7±13.9**	**18.8±8.6**	32±10	**14±4.7^{a}**	25.2±13.6	**20±8.3**	17.1±3.8	14.2±6.4	15.4±6.7	15.1±4.7
DK	25.1±7.1	**17.1±4.4**	**16.1±3.8**	**18±4.1**	24.5±6.7	23.7±11.9^{b}	24±9.5	22.8±5.6	19.1±7.9	17.7±5.2	18.8±7.1	17.7±3.1
DT	26.8±3.2	**17.5±3.6**	19.5±9.5	**15.1±3.4**	24±13	20.7±3.5^{a,b}	19.4±7.8	22.8±9.4	18.2±3.9	17.4±5.2	17.2±8	**15.1±5.7**
Rectal temperature (C°)												
XK	39.6±0.6	39.2±0.6	38.5±0.8	**38.5±0.9^{a}**	39.02±0.4	38.8±0.4	38.5±0.5^{a}	**37.9±1**	37.9±0.5	37.8±0.5	37.5 ±0.2	37.7±0.4
DK	39.4±0.8	38.7±0.6	38.5±0.5	**38.4±0.7^{a}**	38.4±0.9	38.4±0.9	38.3±0.9^{a}	38.07±1.1	38.4±0.2	38.2±0.4	38.06±0.3	**37.9±0.3**
DT	39.5±0.5	39±0.5	38.9±0.6	38.7±0.4^{b}	38.7±0.7	39.1±0.6	39±0.7^{b}	38.6±0.7	38.6±0.5	38.5±0.2	38.3±0.2	38.04±0.2

^{a,b} Corresponding means with different superscripts differ significantly ($P \leq 0.05$) among anesthetic protocol for each variable.
Bold number differ significantly ($P \leq 0.05$) from baseline values

TABLE 2. Hematological and plasma biochemical values (mean±SD) in Nubian goats following XK, DK, and DT anesthetic protocols were measured before and after anesthesia in controls, during surgery, and at 4 weeks post-surgery.

	Controls		During surgery		4 weeks post- surgery	
Variables Protocols	**Before anesthesia**	**After anesthesia**	**Before anesthesia**	**After anesthesia**	**Before anesthesia**	**After anesthesia**
Total protein (g/dl)						
XK	7.3±0.41	6.04±2.4	8.9±1.1	**5.04±1.5**[a]	8.6±0.5	8.9±1.0[a]
DK	6.03±0.5	**6.7±0.72**	6.4±0.6	6.7±0.5[b]	6.1±1.0	6.9±1.3[b]
DT	6.04±1.8	6.3±0.71	7.1±0.9	6.9±0.5[b]	8.2±1.0	**7.1±0.6**[b]
Plasma glucose level (mg/dl)						
XK	49.6±12.7	42.2±8.9	38.5±12.1[a]	**44.3±5.6**	57.1±25.1	**38.5±12.1**[a]
DK	61.9±18.4	55.1±12.7	42.8±15.8[a,b]	42.8±19.6	41.5±15.6	34.8±24.7[b]
DT	56.4±21.2	52.4±16.1	70.1±21.5[b]	63.3±27.7	45.5±12.7	44.1±8.4[a]
Packed cell volume (%)						
XK	25.7±3.9	25.6±6.1[a]	22.3±7.3	22.1±2.9	20.3±4.9	22.3±7.3
DK	35.7±5.6	38±6.7[b]	24.4 ±6.7	22.6±6.7	22.8±3.9	24.8±4.7
DT	28.8±3.7	31.1±5.6[a,b]	27.8±7.9	28.2±10.2	30.2±6.1	32.3±6.3
Hemoglobin (g/dl)						
XK	10.9±0.75	11.1±0.54	9.6±1.1	9.4±0.86	9.9±0.97	9.6±1.1
DK	12.1±1.8	12.3±1.7	10.3±1.7	10.2±1.9	9.6±2.1	9.7±2.1
DT	11.5±2.1	11.4±2.4	15.6±1.1	15.1±0.81	11.2±2.1	11.1±2.7

[a,b] Corresponding means with different superscripts differ significantly ($P \leq 0.05$) among anesthetic protocol for each variable.

Bold numbers differ significantly ($P \leq 0.05$) of the time before anesthesia versus after anesthesia

TABLE 3. Duration of the anesthetic phase (mean±SD) in Nubian goats following XK, DK and DT anesthetic protocols measured in controls, during surgery and at 4weeks post-surgery.

Variables	Control	During surgery	4 weeks post-surgery
XK	18.7±2.6[a]	21.1±4.09	18.1±4.8[a]
DK	17±0.8[a]	25.1±4.7	18.7±8.9[a]
DT	26±4.6[b]	25.7±4.8	28.7±3.5[b]

[a,b] Corresponding means with different superscripts differ significantly ($P \leq 0.05$) among anesthetic protocol.

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مقارنة استخدام الزبلازين والكيتامين، الديازيبام والكيتامين، والديازيبام والثيوبنتال اثناء عمليات فتح الكرش فى الماعز

صفاء أمين [1]، عباس صوبير [1]، عوض رزق [2] و محمد سالم [2,3]

1 قسم الجراحة والتخدير- كلية الطب البيطرى - جامعة الخرطوم- السودان.

2 قسم الجراحة والتخدير والاشعة، كلية الطب البيطرى جامعة المنصورة- مصر.

3 قسم العلوم الطبية البيطرية الاكلينيكية - كلية الطب البيطرى- جامعة العلوم والتكنولوجيا الاردنية- اربد – الاردن.

الملخص

يستخدم التخدير العام فى الماعز بنفس الادوية المستخدمة فى الفصائل الاخرى مثل الثيوبنتال والبروبوفول والكيتامين. تهدف هذه الدراسة الى تقييم استخدام ثلاثة بروتوكولات تخدير فى الماعز النوبية اثناء عملية فتح الكرش. اجريت هذه الدراسة على عدد 32 من الماعز قسمت على اربعة مجموعات كل مجموعة تحتوى على 8 حيوانات. المجموعة الاولى الزيلازين مع الكيتامين- المجموعة الثانية الديازيبام مع الكيتامين- المجموعة الثالثة الديازيبام مع الثيوبنتال والمجموعة الرابعة مجموعة ظابطة. وتم قياس عدد ضربات القلب والحرارة وعدد مرات التنفس و بعض قياسات الدم قبل واثناء وبعد الجراحة فى اوقات محددة.وقد اظهرت النتائج زيادة ملحوظة فى وقت التخدير فى مجموعة الديازيبام مع الثيوبنتال. وقد استنتج من هذة الدراسة ان استخدام الديازيبام مع الثيوبنتال يوفر تخدير عميق ذو وقت اطول مقارنة مع البروتوكولات الاخرى.

الكلمات الدالة :الديازيبام- الكيتامين- الثيوبنتال- فتح الكرش- الزيلازين- ماعز