EVALUATION OF XYLAZINE-KETAMINE AND XYLAZINE - ACEPROMAZINE -KETAMINE FOR SURGICAL INTERVENTION IN MUGGER CROCODILES *(CROCODYLUS PALUSTRIS)*

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ABSTRACT

The study was conducted in twelve crocodiles, divided into two groups of six each. Group I crocodiles were premedicated with xylazine @ 1.5 mg/kg and group II were premedicated using a combination of xylazine and acepromizine @ 1.5 mg/kg and 0.1 mg/kg body weight intramuscular respectively. In both the groups induction and maintenance were carried out by administering ketamine @ 20 mg/kg body weight intramuscularly. In this study, group II animals (xylazine- acepromazine with ketamine) provide excellent muscle relaxation, smooth induction and recovery. So this combination could be used for all major surgeries, xylazine and ketamine combination could be useful for minor procedures like translocation.

KEY WORDS: Crocodiles, Xylazine and Ketamine, Xylazine- Acepromazine with ketamine

INTRODUCTION

Crocodilians, an important group of reptiles, maintained in zoological parks and commercial farms worldwide, often require chemical restraint because of their large size and aggressive disposition (Arora, 2006). Crocodiles are poor subjects for anaesthesia because of their physiologic resilience, pseudodiaphragm and prolonged recovery. The selected anaesthetic regimen should provide smooth induction and recovery, adequate plane of anaesthesia and analgesia to facilitate the surgical and diagnostic procedures. The slow metabolic rate makes induction and recovery prolonged as compared with other mammals (Bennett, 1998). However, many crocodilian anaesthetic reports based on few animals and that too large drug dosages and routes of administration and no authenticated evaluation of anaesthetic monitoring or physiological parameters are available. Hence this study was conducted to evaluate xylazine-ketamine and xylazine-acepromazine-ketamine for surgical intervention in Mugger crocodiles

MATERIALS AND METHODS

This study was conducted in twelve crocodiles at Aringar Anna Zoological Park Vandaloor. The crocodiles were divided into two groups of six each. Captive and free range Mugger crocodiles (*Crocodylus palustris*) requiring chemical immobilization for various purposes such as ablation of sulcus spermaticus, ovariosalpingectomy, cloacal prolapse and translocation were selected.

The animals were fasted for 48 hours prior to all experimental procedures. The technique used for all crocodiles were, locally made 3 metres length bamboo pole to which a wrought iron noose was fixed firmly at one enclosure and the selected isolated crocodile was secured by applying the noose around the neck. The crocodile was secured by a team of trained attenders by holding its tail and limbs. Then it was tied using ropes. All the crocodiles were premedicated with anticholinergic glycopyrrolate @ 0.02 mg/kg body weight intramuscularly (gluteal or lateralis of hind limb). Group I crocodiles were premedicated with alpha-2-agonist xylazine @ 1.5 mg/kg body weight intramuscularly. Group II crocodiles were premedicated using a combination of xylazine and acepromizine @ 1.5 mg/kg and 0.1 mg/kg body weight intramuscularly. In both the groups induction

and maintenance were carried out by administering ketamine @ 20 mg/kg body weight intramuscularly after the loss of tail reactivity to noxious stimuli. In three cases maintenance doses (10 mg/kg) were required (ovariosalpingectomy and cloacal prolapse).

Temperature of operation theatre was maintained between 23 and 26^0C. The ECG leads were attached to fore and hind limbs webs and the heart rate, pulse rate, respiration rate and temperature were monitored. ECG lead placement, the paper speed and electrical sensitivities were set according to the guidelines previously established for crocodilians (Bailey and Pablo, 1998). The crocodiles were kept in operation theatre after the surgery until they showed signs of recovery such as tail movement and response to toe pinch. The crocodiles were released in the tank which was dusted with turmeric powder as an antiseptic

The crocodiles were monitored for recovery until they showed righting reflex, blinking reflex, protective function of nasal valves, hissing and threatened open mouth behaviour. When it was considered safe, the tank was filled with water partially to keep the nostrils exposed. Sedative and anaesthetic, dosage study, cardio-pulmonary and haematobiochemical parameters were studied. Serum creatinine, uric acid, glucose and protein were estimated in milligram/decilitre using Jaffe's kinetic method, enzymatic photometric test, glucose oxidase and modified Biuret and Dumas method using semi auto analyser respectively.

RESULTS AND DISCUSSION

The time for sedation and induction in minutes in group I and II were found to be 25.50 ± 1.87, 19.17± 1.33 and 25.66± 1.03, 21.83± 1.72 respectively. The sedation and induction time decreased significantly ($P< 0.01$) in group II The duration for anaesthesia in minutes in group I and II were found to be 44.83 ± 2.31 and 57.0 ± 2.0, respectively. There was a significant (P) decrease in the duration of anaesthesia in group I. The time for recovery in hours in group I and II were found to be 4.41 ± 0.30 and 5.11 ± 0.11, respectively. Significant decrease in the time for recovery in group I was observed and this might be due to the use of tranquilizer. The purpose of combination is to achieve more specific target responses and minimize the side effects of the drugs. To date xylazine-acepromazine and ketamine have emerged as one of the most popular combination for induction of anaesthesia in wild animals , which provide better quality of anaesthesia, rapid and smoother induction, recovery; improve muscle relaxation and analgesia during maintenance (Riviera and Pires, 2003, Schumacher *et al.,* 1997).

The quality of anaesthesia was assessed based on the presence, sluggishness and absence of reflexes and degrees of muscle relaxation. The depths of anaesthesia in both the groups were good. Corneal reflex and palpebral reflex were predominant and toe pinch withdrawal was predominantly sluggish in group I. The higher percentage of intact and sluggish corneal, palpebral and toe pinch withdrawal reflex could be attributed to the effect of ketamine and separation of reflexes to varying degrees which could be attributed to combined effect of xylazine, ketamine and tranquilizers (Haskin *et al.,* 1986). Four animals in the group II and two in group I showed excellent muscle relaxation. During excellent muscle relaxation the cloacal scales were relaxed and allowed easy cloacal examination (Mosley, 2005). During recovery period two animals in group I and five animals in group II showed normal post operative behaviour.

There was a significant decrease in the intra and post-operative temperature, compared to the pre-operative in both groups and it coincided with the findings of Kumar *et al.* (1990). This might be due to depletion of catecholamine from the thermoregulatory centre and making the animal tend to pick up the environmental temperature due to the action of xylazine. There was a highly significant decrease in heart and respiratory rates intra-operatively in both the groups compared to the preoperative rates and this might be due to the effect of xylazine on centrally mediated cardio vascular system through vagus (Plum, 2005).

Statistically no significant difference was observed between pre and intra and post operative values of haemoglobin, packed cell volume and total erythrocyte and leucocyte count in both the groups. These were in accordance with the findings of Wiersig *et al.,* (1974). Similarly there was no significant difference between pre and intra and post operative values of creatinine and uric acid level in both the groups.

Serum glucose were significantly ($P< 0.01$) increased in the intra and post-operative as compared to preoperative value in all groups. The normal levels of glucose in adult mugger crocodile are 55 to 87 mg/dl (Stacy and Whitaker, 2000). This hyperglycemia could be attributed to increased sympathetic activity, decreased in membrane transport of glucose, impaired insulin activity through 1-2 adrenergic receptors by the pancreatic cells and increased adrenocorticol hormone concentration (Knight, 1980). But total serum protein values were significantly decreased in the intra and post-operative values as compared to pre-operative values. The normal levels of total serum protein levels in adult mugger crocodile are between 2.9 and 3.9 g/dl (Stacy and Whitaker 2000). The reduction in serum protein levels in all the combination could be attributed to temporary haemodilution due to migration of interstitial fluid to vascular system (Reddy *et al.,* 1991).

In this study, group II animals (xylazine-acepromazine with ketamine) provide excellent muscle relaxation, smooth induction and recovery. So this combination could be used for all major surgeries. Xylazine and ketamine combination could be useful for minor procedures like translocation.

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