COMPARATIVE CLINICAL STUDIES ON ANAESTHESIA USING KETAMINE-DIAZEPAM AND ISOFLURANE IN BIRDS

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ABSTRACT

A total 20 birds affected with various kinds of injuries due to kite strings were studied. The birds were divided into two groups of 10 each. Anaesthesia was induced with Isoflurane and Ketamine-Diazepam combination in group in 1 and 2, respectively. Isoflurane anaesthesia was administered using non rebreathing Ayere's T -piece system, in other group; Ketamine-Diazepam anaesthesia was induced by I/M route. Physiological parameters viz. Heart rate and respiration rate were recorded after induction of anaesthesia every 5 minutes till the surgical procedure was over and the birds recovered from the anaesthesia. A marked salivation was observed during use of the combination of Ketamine-Diazepam. Ketamine-Diazepam combination was not found suitable for major surgery in birds because this combination accompanied by muscular tremor and myoclonic craps, and also there was increase in heart rate in comparison to the other group of anaesthesia. Recovery after use of the Isoflurane was smooth and easy in comparison to the use of the Ketamine-Diazepam anaesthesia. Overall, the quality of anaesthesia (muscle relaxation, abolition of pain and minimum cardiopulmonary deviation) was significantly better and excellent in Isoflurane group of anaesthesia then the Ketamine-Diazepam group for surgery.

KEYWORDS: Isoflurane, Ketamine-Diazepam, Birds' anaesthesia.

INTRODUCTION

Isoflurane is a highly stable, non explosive, potent, and noninflammable volatile anaesthetic. It is not affected by light, requires no chemical stabilizers, and does not react with soda lime, metal or rubber (Dohoo, 1990).Ketamine is a least potent dissociative anaesthetic agent because it lacks cardio-pulmonary depression effect. Ketamine induces amnesia and anaesthesia of stage-1 and stage-2 but not stage-3 anaesthesia (Booth, 1998).The combination of Ketamine-Diazepam did not produce the depth of the anaesthesia required for surgical procedures. However, the depth of anaesthesia could be modulated by increasing dose of Diazepam (Christensen *et al.* 1987). An oxygen flow rate of 150 to 200 ml/kg/min was commonly reported. Induction is more rapid in birds then mammals due to the greater lung surface area and an efficient cross-current gas exchange in capillaries (Degernes, 2008).

In view of the above, a study was planned using inhalant and injectable anaesthetics in the birds to test the efficacy of Isoflurane and a combination of Ketamine and Diazepam to restraining birds and also to evaluate the successful conduction of surgical procedure with Isoflurane and Ketamine - Diazepam combination.

MATERIALS AND METHODS:-

In the present study, a total of 20 birds were subjected to various anaesthetic regimens for minor and major surgical conditions. On the basis of level of anaesthetic risk and surgical procedure to be performed, these birds were allotted to specific anaesthetic protocol. The birds were divided into two groups of 10 birds each based on the protocol of anaesthesia;

(1) Group I: Isoflurane induced. (n = 10)(6 kites,1 Stepie eagle, 1 Gray heron, 1 Comb duck,1 Leaser whishling) (2) Group II: Ketamine- diazepam induced. (n = 10) (9 kites, 1 vulture)

Isoflurane (2%) was used in 10 birds by non rebreathing system using the Ayere's T -piece method. For induction of gas anaesthesia in bird usually plastic gasket with tape over opening was used. The plastic gasket was sealed by applying cotton around the neck of birds. Mask can be modified to accommodate the anatomic variation of avian species. After induction of anaesthesia, the mask was removed from the bird and intubation was done. Intubation was done after the patient was adjudged in a medium plane of anaesthesia (no muscle tone and no response to a toe pinch).The glottis was located at the caudal aspect of the tongue. Intubation was facilitated by holding upper and lower beak and pushing dorsally on the tongue beneath the intermandibular space. Once the bird was intubated, the tube was secured by tape with mandible and the neck was extended to prevent kinking of the trachea. After intubation, surgery was conducted by maintaining the plane of anaesthesia as per the condition of the bird.

The Ketamine-Diazepam combination was used for another group of 10 birds. Ketamine 0.4 mg/ kg and Diazepam 0.2 mg/kg combination was given in ratio of 2:1 by intramuscular route. After giving anaesthesia when the birds showed signs of muscle relaxation, loosing palpebral reflex and change in breathing pattern, then the surgical procedure was conducted.

There are different types of birds in Group I and Group II which includes *kites, vulture, Stepie eagle, Gray heron, Comb duck, Black kite, Leaser whishling.* In both the groups, birds having the injuries like propatagium rupture, fracture of wing, lacerated wound. Birds presented with ruptured propatagium membrane were surgically corrected with general anaesthesia using Isoflurane. The wounds were cleaned and all contaminants were removed and debrided. Subcutaneous tissue and skin of ruptured propatagium membrane were opposed using No. 3-0 vicryl 4, following simple interrupted pattern. Figure '8' bandage was applied on operated wing and strapping of wing to the body was done to provide good immobilization.

Amputation of wing was performed under general anaenesthesia using Isoflurane as an inhalation anaenesthetic. After achieving the desired analgesia, feathers were plucked from surgical site. The fracture site was thoroughly cleaned and all contaminants were removed. Wing was amputed at the site of fracture. Muscles and soft tissues were opposed by simple interrupted sutures using No. 2-0 vicryl 4. Figure '8' bandage was applied on operated wing and strapping of wing to the body was done to provide good immobilization. Fracture repair also done by external and internal fixation method with help of the Isoflurane anaesthesia.

Physiological Parameters

The heart rate and respiration rate was recorded in the birds with the help of stethoscope and by noting the movement of the breathing bag, respectively during both the protocols of anaesthesia at every 5 min interval after induction of anaesthesia.

RESULTS AND DISCUSSION

The present clinical study on 20 cases of birds was undertaken to evaluate the safety and efficacy of Isoflurane and combination of Ketamine-Diazepam. Isoflurane anaesthesia was used in 10 birds. The induction of anaesthesia was quite within 6 to 10 min. During this period, there was complete muscle relaxation and abolition of pain. There was no salivation and eyelid remained closed.

The combination of Ketamine-Diazepam was used for anaesthesia in another 10 birds. The induction by this combination was slow and required 5 to 10 minutes to reach the maximum unconsciousness. During the time of maintenance slight severing and movement of limb were observed. Also during the anaesthesia, marked salivation and shagging of head and neck were

observed. Heart rate and respiratory rate ranged from 240 to 260 beats per minute and from 16 to 28 breaths per minute, respectively as reported by Olga *et al.* (2011). In our experiment when Ketamine-Diazepam and Isoflurane administered as an anaesthetic, respiration rate differed

Figure 1 : Respiration rate in birds administered Ketamine-Diazepam and Isoflurane anesthesia.

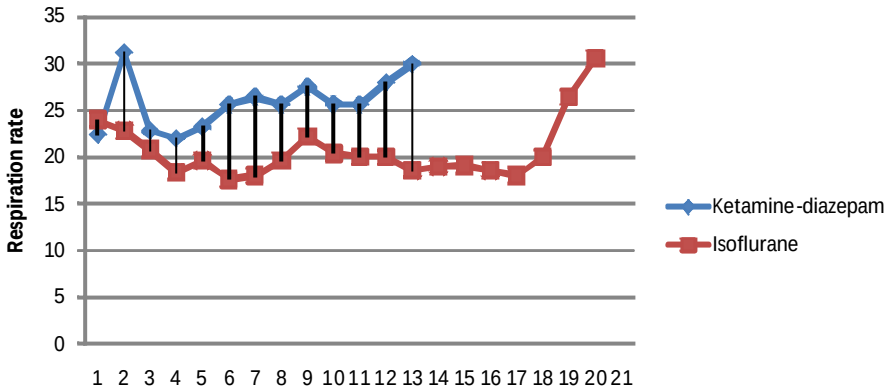
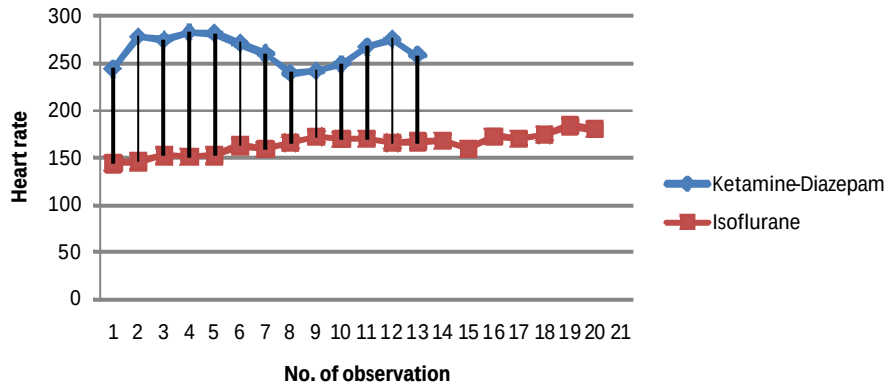


Figure 2: Heart rate in birds administered Ketamine-Diazepam and Isoflurane anaesthesia



significantly (P< 0.05) amongst both the anaesthetic. It remained higher (25.84) in Ketamine-Diazepam then the Isoflurane (20.68) administered birds. When Ketamine-Diazepam administered as anaesthetic, initially there was sudden rise and fall in respiration rate within 5 to 10 minutes but then after it increased steadily. Reaching normancy within 1 hour, while in case of Isoflurane administration birds, it has shown decling trend for 15 minutes initially and then almost remained static which was regaining normancy within 95 minutes with sudden increase of respiration rate within last 15 minutes. The heart rate differed significantly (P< 0.05) amongst both the anaesthetic. It remained 263.176 in Ketamine-Diazepam while it was 164.385 when Isoflurane was administered. When Ketamine-Diazepam administered, heart rate were increased to a similar extent up to 20 minute then after it decreased which was again increased after 40 minutes. While Isoflurane administered birds showed constant but small increase in heart rate till 95 minutes of administration.

A marked salivation was observed during the use of the combination of Ketamine- Diazepam. Ketamine-Diazepam combination was not found suitable for major surgery in birds because this combination accompanied by muscular tremor and myoclonic craps, and also there was increase in heart rate in comparison to Group II birds. Recovery after the use of the Isoflurane was smooth and easy in comparison to the use of the Ketamine - Diazepam anaesthesia. There was nonsignificant difference in the respiration rate of the bird in both the groups. Overall, the quality of anaesthesia, (muscle relaxation, abolition of pain and minimum cardiopulmonary deviation) was significantly better and excellent in Isoflurane group of anaesthesia then the Ketamine -Diazepam group for the purpose.

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