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COMPARATIVE EFFICACY OF DETOMIDINE AND DETOMIDINE - KETAMINE COCKTAIL IN QUAILS

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ABSTRACT

Twenty adult healthy quails (*Coturnix coturnix*) were divided into two equal groups. One group was administered detomidine (2.4 mg/kg, I/M) and other group was administered detomidine-ketamine cocktail (1.2 mg/kg + 30 mg/kg, I/M). Detomidine slowly and smoothly induced a light sedation accompanied by superficial analgesia, hypoventilation, hypothermia and bradycardia in all birds. Detomidine-ketamine cocktail rapidly and smoothly induced a deep anaesthesia accompanied by deep analgesia, hypoventilation, hypothermia and bradycardia and complete loss of all reflexes in all birds. In both groups, recovery from sedation and anaesthesia was smooth and of short duration. From this study it was concluded that for minor and least painful procedures in quails detomidine can be used alone, while for major and painful surgical procedures detomidine-ketamine combination should be preferred.

Key words: Quail, detomidine, ketamine, detomidine-ketamine cocktail.

INTRODUCTION

Safe and effective sedation and anaesthesia methods are as much important for birds as for the other animals not only for surgical procedures but also for safe handling and diagnostic procedures, especially in case of aggressive birds. Sedation and anaesthesia ideally minimize stress during the procedures. These also ensure the safety of the bird and provide adequate restraint during such procedure. Sedative or anesthetic is an agent that produces analgesia, immobilization and loss of consciousness, so that the individual is unresponsive to stimulation. Anaesthetics are administered either as gas or injectable. Injectable anaesthetics and sedatives can be placed in vein, muscle or intraosseous (Heard, 1997).

Detomidine belongs to the group of alpha-2-adrenergic agonists. It is considerably more potent as an agonist of the alpha-2-adrenergic agonist than xylazine. The latter appears to produce more of an alpha-1-adrenergic effect, while detomidine produces such effects only at high doses. This may explain the pharmacological differences between detomidine and xylazine (Forester and Courtot, 2000).

Ketamine hydrochloride is a dissociative anaesthetic and may be administered orally or parenterally. Absorption of ketamine solutions and immobilization has been achieved by squirting the solution into the mouths of captive animals. The drug may be administered alone, but is more commonly used together with xylazine, detomidine, medetomidine, diazepam or azaperone, depending on the species involved. These drugs are combined with ketamine to reduce its cataleptic and convulsogenic effects (Lopez, 2003).

Alpha -2-adrenergic agonists are not recommended as single anesthetic or immobilization agents for birds. In pigeons and Amazon parrots, high doses of medetomidine had a sedative effect but did not immobilize the birds (Sandmeier, 2000). The purpose of this study was to compare the safety and efficacy of intramuscularly administered detomidine (alone) and detomidine-ketamine cocktail in quails.

MATERIALS AND METHODS

This study was conducted on 20 adult and healthy quails (*Coturnix coturnix*). Birds were divided into two groups (A and B), each with 10 birds. Birds were kept off feed 30 minutes prior to drug administration and a pre-medication general physical examination for recording body temperature, respiration rate, heart rate, bird's behaviour and body reflexes was also conducted. All birds were weighed for accurate dose calculation. Birds of group A were intramuscularly administered detomidine at the dose rate of 2.4 mg/kg with insulin syringe (1 ml), while those of group B were intramuscularly administered detomidine and ketamine cocktail at the dose rate 1.2 mg/kg and 30 mg/kg, respectively with insulin syringe (1 ml).

Induction period, duration of sedation/anaesthesia, recovery period, righting reflex, toe pinch reflex,

feather plucking reflex, palpebral reflex, table knock reflex and pharyngeal reflex were recorded. Data were subjected to the statistical analysis for "one way analysis of variance" and statistical difference among the various treatments was determined by "Least Significant Difference test".

RESULTS

In group A induction of sedation was slow and smooth while in group B, induction of anaesthesia was smooth and rapid ($p<0.05$). Detomidine produced a smooth and light sedation, while detomidine-ketamine combination produced a smooth and deep anaesthesia ($p<0.05$). In group A, recovery was smooth and slow. In group B, recovery was smooth and of short duration (Table 1). In group A except feather plucking reflex, all reflexes were present, while in group B, there was a complete loss of all reflexes (Table 2).

Table1: Duration of induction, sedation/ anaesthesia and recovery (min) in birds of groups A and B

Groups	Induction period	Duration of sedation/ anaesthesia	Recovery period
A	10.6 ± 2.06[a]	26.1 ± 3.75[b]	29.2 ± 3.45[a]
B	2.0 ± 0.63[b]	65.2 ± 14.25[a]	23.3 ± 12.75[a]

Values with different superscripts for each parameter differ significantly from each other ($p<0.05$).
A: Birds treated with detomidine.
B: Birds treated with detomidine + ketamine cocktail.

Table 2: Body reflexes during sedation and anaesthesia in birds of groups A and B

Reflexes	Groups	
	A	B
Righting	+	-
Toe pinch	+	-
Feather plucking	-	-
Palperbral	+	-
Table knock	+	-
Pharyngeal	+	-

A: Birds treated with detomidine.
B: Birds treated with detomidine + ketamine cocktail.
-: Body reflex absent.
+: Body reflex present.

Birds in group A experienced hypothermia, hypoventilation and bradycardia during sedation that persisted till recovery. Similarly, birds of group B also experienced hypothermia, hypoventilation and bradycardia during anaesthesia that also persisted till recovery (Table 3). In group A analgesia was superficial with mean duration of 39 ± 2.83 minutes, while in group B, it was deep and its mean duration was 104 ± 8.49 minutes.

Table 3: Mean temperature, respiration rate and heart rate before, during and after sedation and anaesthesia in groups A and B

Mean values	Groups	
	A	B
During sedation/anaesthesia		
Temperature (ºF)	100.4 ± 1.80	101.4 ± 1.74
Respiration rate/min	38.0 ± 7.63	33.0 ± 10.44
Heart rate/min	215.0 ± 22.11	246.0 ± 2.51
After recovery		
Temperature (ºF)	103.6 ± 2.15	105.8 ± 0.45
Respiration rate/min	50.0 ± 4.50	48.0 ± 6.0
Heart rate/min	242.0 ± 11.40	247.0 ± 4.72

A: Birds treated with detomidine.
B: Birds treated with detomidine + ketamine cocktail.
Mean normal values in quails:
Body temperature: 106.5ºF
Respiration rate/min: 60
Heart rate/min: 255

DISCUSSION

Detomidine is a potent, non-narcotic, sedative, muscle relaxant and analgesic alpha-2- adrenergic agonist that has been used in wide range of wild and domestic animals and birds. Ketamine is a least potent dissociative anaesthetic agent because it lacks cardio-respiratory depression effect. Ketamine induces amnesia and anaesthesia of stage I and stage II but not stage III anaesthesia when used alone. Different studies on individual use of detomidine and its cocktail with ketamine have suggested that instead of using detomidine alone it should be used as a cocktail with ketamine. Detomidine and ketamine have synergistic effect for each other and their required doses are reduced to half of their individual doses. In this way their efficacy is enhanced and side effects are reduced to some extent.

The aim of this study was to observe the difference in efficacy of detomidine and detomidine-ketamine cocktail in quails. During this study, individual and synergistic effects of detomidine and detomidine-ketamine were studied. In detomidine treated birds induction period and recovery period were longer as compared to those in detomidine-ketamine treated birds. Detomidine induced a light and short sedation, while detomidine-ketamine cocktail induced a deep and long anaesthesia, as reported earlier by Forester and Courtot (2000) and Sandmeier (2000). Detomidine is known to produce a light and superficial analgesia (somatic and visceral) at low doses, while ketamine produces visceral analgesia. It explains why in detomidine treated birds analgesia was very superficial

and except feather plucking reflex all reflexes were present. Earlier studies have also shown that detomidine-ketamine cocktail synergistically produced a deep analgesia and all body reflexes were absent (Virtanen, 1986; Schatzman *et al*., 2001). Some desirable effects of detomidine-ketamine cocktail were also observed on body temperature, respiration rate and heart rate. The severity of hypothermia, hypoventilation and bradycardia was lesser in detomidine-ketamine treated birds as compared to those in detomidine treated birds, as has been reported earlier (Caulkett *et al.,* 2000; Sandmeier, 2000).

On the basis of this study it is suggested that in quails, for least painful and minor procedures detomidine (alone) can be used safely with proper thermoregulatory measures. Detomidine produces a light sedation and superficial analgesia with a smooth induction and recovery. For severely painful and major surgical procedures detomidine-ketamine cocktail can be used safely. Detomidine-ketamine cocktail produces a deep anaesthesia and analgesia with a smooth and rapid induction and smooth recovery.

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