

ELECTROCARDIOGRAPHIC PARAMETERS OF CAPTIVE ARABIAN LEOPARDS (*PANTHERA PARDUS NIMR*) IMMOBILISED WITH MEDETOMIDINE AND KETAMINE

Christopher Lloyd BVSc MSc CertZooMed MRCVS

Nad Al Shiba Veterinary Hospital, PO Box 116345, Dubai, UAE, chris@nadvethosp.com

Introduction

The Arabian leopard (*Panthera pardus nimr*) is a critically endangered subspecies endemic to the Arabian Peninsula. The establishment of baseline physiological data is vital for the management of captive endangered species both to avoid the use of sub-optimal animals for breeding and to ensure captive specimens enjoy a successful reproductive lifespan. The electrocardiogram (ECG) can be used as a rough guide to evaluating the heart myocardium, rhythm, size and electrolyte imbalances. Standardisation of ECG parameters in the Arabian leopard would be a useful first step in identifying possible cardiac abnormalities in this species.

Five adult, healthy, captive Arabian leopards (3 males / 2 females) from a collection in the United Arab Emirates were anaesthetised on one day for clinical evaluation, genetic sampling, haematology, biochemical and serological examination and electrocardiogram measurements. Animals were starved for 24 hours prior to anaesthesia and darted by blowpipe with medetomidine (Domitor 1mg/ml, Pfizer) followed 10-15 minutes later by ketamine (Ketamil 100mg/ml, Ilium). On completion of the procedures an equal volume of atipamezole (Antisedan, Pfizer) to that of domitor was given intramuscularly to reverse anaesthesia. Average dose rates and details are presented in Table 1

Table 1: Dose rates and response time of Arabian Leopards anaesthetised with medetomidine and ketamine

| Average dose (min-max) medetomidine (mg/Kg) | Average time (min-max) to sternal recumbancy (minutes) | Average dose (min-max) ketamine (mg/ Kg) | Average procedure length(min-max) (minutes) | Time from atipamezole administration(min-max) to head up (minutes) |
|---|--|--|---|--|
| 0.075 (0.066-0.092) | 3.8 (2-7) | 3.6 (3.1-4.6) | 54 (50-58) | 11.6 (10-16) |

The ECG traces were recorded by the standard procedures recommended for domestic animals. The animals were placed in lateral recumbancy and leads attached to forelimbs (just proximal to olecranon) and hindlimb (over patellar ligament). The trace was recorded on a Cardiostore digital ECG recorder (Vetronic service, UK) and measurements taken on associated software after downloading to a personal computer. All leads were examined for rhythm and lead II was used to take measurements of duration and amplitude of deflection. Results are described in Table 2

Table 2: Average ECG measurements from five Arabian leopards taken from lead II

| Lead II Measurement | Heart Rate (beats per min) | P wave duration (msec) | P amp (mv) | PR interval (msec) | QRS duration (ms) | Q amp (mv) | R amp (mv) | S amp (mv) | T amp (mv) | QT interval (ms) | ST interval (ms) |
|---------------------|----------------------------|------------------------|------------|--------------------|-------------------|------------|------------|------------|------------|------------------|------------------|
| Average | 70.4 | 63.20 | 0.08 | 141.00 | 71.80 | 0.03 | 0.84 | 0.04 | 0.28 | 292.47 | 149.47 |
| Standard deviation | | 6.72 | 0.02 | 15.86 | 13.48 | 0.03 | 0.15 | 0.04 | 0.10 | 17.75 | 18.67 |

These findings are similar to those found in lions and tigers (Larsson et al 2008) although the PR interval was slightly shorter in the leopards as would be expected due to the comparatively lower cardiac muscle mass of this species. In lead II the P wave and QRS complexes and the mean electrical axis was always positive. In two animals the S wave was present and in three the Q wave was present. In all cases if the Q wave was present the S wave was not and vice versa.

The cardiac depressant and stimulating effects of medetomidine and ketamine respectively will have an effect on the normality of the ECG trace, however, it is impractical to obtain measurements in non domestic carnivores without anaesthesia. For instance, the leopards' heart rate was compatible to that of lions and tigers anaesthetised with xylazine and ketamine (Larsson et al 2008). According to allometric scaling, a higher heart rate should be expected in the leopards. It may be that this is due to the lower doses of ketamine used in this study compared to the dose used by Larsson et al. (2008). While this is too small a sample size from which to come to any final conclusions on normal ECG values for Arabian leopards, the author is not aware of any other published values in this species. We hope this data will encourage others working with this endangered cat to gather and share data on ECG and other parameters.

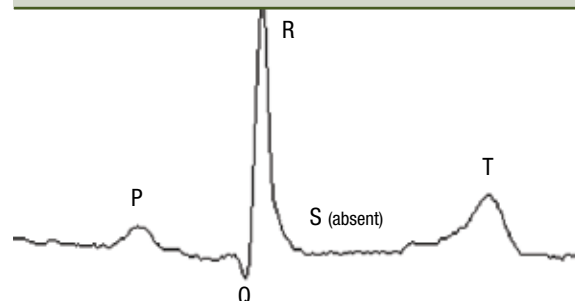


Fig1. Typical ECG trace with waves labeled. This leopard had no S wave.

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References

Larsson, MHMA; Coelho MA; et al (2008). Electrocardiographic parameters of captive lions (*Panthera leo*) and tigers (*Panthera tigris*) immobilized with ketamine plus xylazine. *Journal of Zoo and Wildlife Medicine* 39(3): 314-319. 2008



Fig2. Arabian leopard (©C Lloyd).