Isoflurane anaesthesia in an African wild dog, *Lycaon pictus*

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ABSTRACT

Anaesthesia was required in a captive female African wild dog (*Lycaon pictus*) for surgical wound treatment. After it was immobilised with a medetomidine-ketamine combination, bradycardia, hypothermia, systolic hypertension and metabolic acidosis were observed. Surgical anaesthesia was maintained with a 1 % end-tidal isoflurane concentration. A decrease in the arterial blood pressure, rectal temperature and pH occurred during maintenance of anaesthesia.

Key words: acidosis, anaesthesia, hypertension, isoflurane, ketamine, *Lycaon pictus,* medetomidine, wild dog.

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Anaesthesia for surgical treatment was required in a captive, 1-year-old, female African wild dog (*Lycaon pictus*) of approximately 17 kg body weight. The animal was immobilised with a mixture of 0.7 mg medetomidine (41 µg/kg) (Domitor, Novartis) and 40 mg ketamine hydrochloride (2.3 mg/kg) (Anaket, Kyron Laboratories), and transported in a crate to the Onderstepoort Veterinary Academic Hospital (OVAH), Faculty of Veterinary Science, University of Pretoria.

The perioperative cardiopulmonary variables are presented in Table 1, and the arterial blood-gas analysis in Table 2. Cardiopulmonary variables were monitored with the Cardiocap II and Capnomac Ultima (Datex, Helsinki). Arterial blood pressure was measured from the dorsal pedal artery. After endotracheal intubation, anaesthesia was maintained with a 1 % end-tidal isoflurane (Forane, Abbott) concentration on a circle anaesthetic machine with carbon dioxide absorption.

Medetomidine is an alpha$_2$ adrenergic agonist with potent sedative-hypnotic, muscle relaxant and analgesic effects, and was administered as an anaesthetic adjunct to ketamine to facilitate muscle relaxation and anaesthesia. Before inhalation anaesthesia, bradycardia (35 beats/min) associated with unexpectedly prolonged high systolic blood pressure (28.2 kPa, 60 min after immobilisation) was present in the wild dog. Medetomidine is reported to exert a biphasic blood pressure response, characterised by an initial transient increase, followed by a prolonged decrease. The increase in blood pressure is the result of an increase in systemic vascular resistance[4]. The low heart rate may have been a reflex physiological response to the high blood pressure, or the result of hypothermia (37 °C). In midazolam/ketamine-anaesthetised domestic dogs, a systolic and mean arterial blood pressure of 22.3 and 16.5 kPa has been reported[2]. The decrease in blood pressure during maintenance of anaesthesia was probably the result of a decrease in the peripheral vascular resistance due to the isoflurane[3].

Medetomidine and hypothermia decrease the dose of inhalation agents required for anaesthesia[1,6], and therefore probably contributed to the low end-tidal isoflurane concentration (1 %) required to maintain surgical anaesthesia in the wild dog. Medetomidine decreases body temperature[5]. Low ambient temperatures during the winter, and exposure to air-conditioning, probably contributed to the further decrease in temperature (35.5 °C) during treatment. Metabolic acidosis was present, and was probably the result of anaesthesia and hypothermia.

Table 1: **Mean** (SD) **cardiopulmonary variables in an African wild dog after medetomidine/ketamine immobilisation, and during isoflurane anaesthesia.**

Variable[a]	M/K	ISO
HR (beats/min)	35	59.0 (10)
SYS (kPa)	28.2	20.0 (1.9)
DIA (kPa)	10.4	8.5 (0.8)
MAP (kPa)	13.6	10.5 (1.0)
F (breaths/min)	14	14 (1.0)
VT (mℓ)	543	303 (29)
VE (ℓ)	7.6	4.2 (0.03)
$ETCO_2$ (%)	–	5.6 (0.1)
Etiso (%)	–	1.0 (0.2)

[a]HR = heart rate; SYS = systolic blood pressure; DIA = diastolic blood pressure; MAP = mean arterial blood pressure; F = ventilation rate; VT = tidal volume; VE = minute volume; $ETCO_2$ = end-tidal carbon dioxide concentration; Etiso = end-tidal isoflurane concentration; M/K = midazolam-ketamine; ISO = isoflurane.

Table 2: **Arterial blood-gas variables in an African wild dog after immobilisation with medetomidine/ketamine and during isoflurane anaesthesia.**

Variable[a]	M/K	ISO
pH units	7.41	7.34
$PaCO_2$ kPa	4.1	4.8
TCO_2 mmol/ℓ	20.4	20.8
PaO_2 kPa	12.8	60.4
HCO_3 mmol/ℓ	19.4	19.6
SBE mmol/ℓ	–4.4	–5.7
SBC mmol/ℓ	21.1	19.7
SAT (%)	97.4	99.9
O_2CT mmol/ℓ	15.4	18.2

[a]$PaCO_2$ = arterial partial pressure of carbon dioxide; TCO_2 = total carbon dioxide; PaO_2 = arterial partial pressure of oxygen; HCO_3 bicarbonate concentration; SBE = standard base excess; SBC = standard bicarbonate; SAT = oxyhaemoglobin saturation; O_2CT = oxygen content; M/K = midazolam-ketamine; ISO = isoflurane.

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