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CASE REPORT

Overdose during chemical restraint in a black rhinoceros (*Diceros bicornis*)

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Abstract

A juvenile female black rhinoceros (*Diceros bicornis*) was successfully treated after overdose of drugs used for chemical restraint. Subsequent general anaesthesia for surgical reduction of a recurrent rectal prolapse was uneventful. Over a 25-minute period before transportation to the veterinary hospital, the animal received a total dose of 1.225 mg etorphine, 30 mg acepromazine and 30 mg detomidine. Based on an *estimated* mass of 200 kg, these corresponded to doses of 6.1 μg kg^{-1} etorphine, 150 μg kg^{-1} acepromazine, and 150 μg kg^{-1} detomidine which constitutes considerable overdose for each drug given separately, notwithstanding the synergy that probably resulted when the three drugs were present concurrently. The estimated body mass may have substantially overestimated the actual body mass and exacerbated overdosage. The animal was recumbent and apnoeic on arrival at the hospital. Heart sounds were auscultated and a weak peripheral pulse was palpated; no pulse deficits were detected, although the heart rate was low. The trachea was intubated, inspired breath was enriched with oxygen and the lungs ventilated manually. Diprenorphine (1.5 mg) was given intravenously and spontaneous breathing resumed 11 minutes later. After induction of general anaesthesia using isoflurane, emergency surgery for correction of rectal prolapse was performed, from which the animal recovered uneventfully. The case highlights some of the practical problems that may be encountered in dealing with dangerous and unfamiliar species.

Keywords anaesthesia, resuscitation, overdose, rhinoceros.

Introduction

The chemical immobilization and anaesthesia of free-ranging rhinoceros species has been described (Harthoorn 1962; Nelson & Fowler 1986; Kock et al. 1990, 1995; Raath 1999; Stegmann et al. 2001). However, little information is available on anaesthesia of captive rhinoceros, or on their anaesthetic management under hospital conditions (Radcliffe et al. 2000a,b; Atkinson et al. 2002). This case report describes treatment of inadvertent overdose of drugs that had been used for chemical restraint in a captive-bred, juvenile female black rhinoceros (*Diceros bicornis*).

Case report

Between 170 and 226 days of age, the rhinoceros had undergone three unsuccessful attempts to surgically repair a severely traumatized third degree rectal prolapse; several different approaches had been used to immobilize the animal for these procedures (Table 1). At 230 days of age the animal

Table 1 Summary of immobilisation drugs administered to a black rhinoceros at 170, 177, 226 and 230 days of age

		Etorphine		Acepromazine		Detomidine		Morphine		
Age (days)	Estimated weight (kg)	Dose (mg)	Dose (μg kg^{-1}), based on estimated weight	Dose (mg)	Dose (μg kg^{-1}), based on estimated weight	Dose (mg)	Dose (μg kg^{-1}), based on estimated weight	Dose (mg)	Dose (μg kg^{-1}), based on estimated weight	Effect observed
170	150	–	–	–	–	7.5	50	–	–	Ambulatory and tractable
177	150	–	–	–	–	8	53	–	–	Ambulatory after detomidine alone.
	–	–	–	10	68	–	–	50	330	Recumbent, able to intubate the trachea
226*	200	–	–	–	–	12	60	–	–	Still lively, but could separate from mother
	–	–	–	10	50	9	45	60	300	Standing, but quiet enough to permit extradural lumbosacral injection
230	200	1.225	6.1	30	150	30	150			Collapse

*Supplemented by lumbosacral epidural anaesthesia (bupivacaine 50 mg, morphine sulphate 10 mg).

was chemically restrained and transported from the referring institution to the veterinary teaching hospital for a fourth attempt at surgical correction of the prolapse.

Before dosing for chemical restraint, the animal had been estimated to weigh 200 kg and it was intractable and belligerent. To facilitate transportation, etorphine hydrochloride (1.225 mg) and acepromazine maleate (5 mg) (Large Animal Immobilon; C-Vet Veterinary Products, Lancashire, UK) were administered intramuscularly (IM) by dart. Fifteen minutes later, the animal was given IM detomidine (25 mg) (Domosedan; Pfizer Animal Health, Kent, UK) and acepromazine (15 mg) (ACP 10 mg mL^{-1}; C-Vet Veterinary Products). A further 10 minutes later, more detomidine (5 mg) and acepromazine (10 mg) were administered IM. The animal was then transported in a crate in the back of a van, where it was not observed.

On arrival at the hospital, approximately 50 minutes after the initial injection of etorphine and the first acepromazine dose, the animal was laterally recumbent, unconscious and in respiratory arrest; its mucous membranes were cyanotic. The heart rate (by thoracic auscultation) was 53 beats minute^{-1}. Palpation of the auricular artery revealed a regular but weak arterial pulse.

The trachea was intubated with a 60-cm long 14 mm id endotracheal tube (Phoenix; Arnolds Veterinary Products, Shrewesbury, UK) under direct vision with the aid of a laryngoscope fitted with a 30-cm Miller pattern blade (Arnolds Veterinary Products). In order to facilitate orotracheal intubation, the jaws were held open with the aid of two lengths of tape, one each across the maxillary and mandibular interdental spaces and pulled dorsally and ventrally respectively. Manual intermittent positive pressure ventilation (IPPV) was started immediately with 100% oxygen delivered via a Boyle Mark IV circle system (BOC Medical, Guildford, Surrey, UK) at 8–10 breaths minute^{-1}. Diprenorphine (1.5 mg) (Revivon; C-Vet Veterinary Products, Lancashire, UK) was administered into a marginal auricular vein. A pulse oximeter (S-100; Simed, Miami, FL, USA) was applied to the tongue where S_pO_2 was found to be 93% soon after IPPV was started. Venous access was established using a 20G Teflon over the needle catheter passed into an auricular vein. Hartmann's solution (Isolec; Ivex Pharmaceuticals, Larne, UK) was administered intravenously at 30 mL kg^{-1} hour^{-1} based on the estimated mass. Once an airway had been established, IPPV initiated and circulatory