

Combination of lidocaine/prilocaine with tramadol for short time anaesthesia-analgesia in chelonians: 18 cases

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Received July 3, 2014

Accepted October 22, 2014

Abstract

The aim of this study was the evaluation of the practical use of lidocaine/prilocaine cream as the local anaesthetic in combination with tramadol anaesthesia for the surgical treatment of prolapsed penis in chelonians. Eighteen animals were included in this study. After administration of tramadol, prolapsed penis was cleaned and disinfected. Lidocaine/prilocaine cream at a dose of 1g/10 cm² was applied on the penile mucosa. The time interval from lidocaine/prilocaine application to a loss of hind limb withdrawal reflex and the response to penile mucosa pinching was recorded as the induction time for surgical anaesthesia. The time interval from lidocaine/prilocaine application to full restoration of tail and hind limb withdrawal reflex was recorded as the recovery time. In two male chelonians the response to pain stimuli persisted for more than 20 min after lidocaine/prilocaine cream application, and the anaesthetic cream had to be re-administered. After this second application of lidocaine/prilocaine cream, surgical anaesthesia was reached within 28 and 32 min. The mean induction time for surgical anaesthesia was 19.22 ± 4.36 min. The mean recovery time was 40.83 ± 7.68 min. In all 18 male chelonians the surgical treatment of prolapsed penis was uneventful. Topical application of lidocaine/prilocaine cream can be used as a feasible form of local anaesthesia in combination with tramadol analgesia management for minor surgical procedures in chelonians.

Reptiles, terrapins and tortoises, pain, minor surgery

Surgical treatment of penile (phallus) prolapse is a common procedure in veterinary practice with captive male chelonians (Raiti 1995; Barten 2006). It has been reported as a sequel to constipation and neurological dysfunction. Prolapse of the penis (or protrusion of the penis for an extended period of time; Bradley 2000) can be a consequence of inflammation of the mucosa of the penis and/or cloaca (cloacitis), a metabolic disease (calcium deficiency), or congenital anomalies (Bennett 1998a; Bradley 2000; Harkewicz 2002; Johnson-Delaney 2012). Prolapsed mucosa becomes quickly hyperaemic and oedematous. Consequent bacterial infections lead to a necrotic/gangrenous inflammation and consequent septicaemia may even cause the death of the patient (Frye 1991). Standard treatment of penile prolapse starts with gentle cleaning of the debris off the mucosal surface and reduction of the volume of swollen tissues. Then a minor surgical approach can be used: mechanical replacement of the penis into the cloaca, or penile amputation. Decision is made according to tissue viability of the prolapsed organ (Rosskopf et al. 1982; Harkewicz 2002; Hernandez-Divers 2004). Surgery has to be performed with the use of an effective form of anaesthesia and analgesia (Barten 2006). Local anaesthesia with lidocaine or procaine for topical anaesthesia in reptiles has been well documented (Schumacher 1996; Bennett 1998b). In conjunction with a suitable agent of general anaesthesia, local anaesthesia was used for minor surgical procedures (Schumacher and Yelen 2006; Schumacher 2007; Gibbons and Klaphake 2013).

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Medical cream EMLA[®], an emulsion mixture that contains 25 mg of lidocaine and 25 mg of prilocaine in one gram, has been used successfully for topical anaesthesia on skin and mucosae in human and veterinary medicine. Lidocaine and prilocaine stabilize the neuronal membranes inhibiting the flow of sodium ions. In the area of its application EMLA[®] induces a biphasic vascular response, when initial vasoconstriction is followed by vasodilation. In human medical practice, EMLA[®] is administered topically 1–2 h before surgery, and the effect lasts for 2 h after removal of the occlusive dressing. The absorption of EMLA[®] by genital mucosa is very rapid (Ehrenström-Reiz and Reiz 1982) which has been tested with excellent results in minor surgeries (Brough et al. 1995; Taddio et al. 1997; Gyftopoulos 2012). Several trials with EMLA[®] have been conducted in dogs, cats, rabbits, and rats (Flecknell et al. 1990; Wagner et al. 2006; Longley 2008). However, almost half of the frogs exposed to combination of lidocaine with prilocaine did not recover and died (Guenette and Lair 2003). Redrobe (2004) suggested the practical use of EMLA[®] applied to reptile skin prior to intravenous injection or catheter placement.

The aim of this study was to evaluate the practical use of lidocaine/prilocaine cream as the local anaesthetics in combination with tramadol for the surgical treatment of prolapsed penis in chelonians.

Materials and Methods

Animals

The group of male chelonians included in this study consisted of 14 animals with acute penile prolapse: 6 Hermann's tortoises (*Testudo hermanni*), 3 yellow-bellied terrapins (*Trachemys scripta scripta*), 2 red-eared terrapins (*Trachemys scripta elegans*), 1 adult African helmeted turtle (*Pelomedusa subrufa*; Plate III, Fig. 1), 1 leopard tortoise (*Stigmochelys pardalis*), 1 Mississippi map turtle (*Graptemys pseudogeographica kohnii*), and 4 animals with chronic penile prolapse: 3 Hermann's tortoises (*Testudo hermanni*), and 1 yellow-bellied terrapins (*Trachemys scripta scripta*).

Anaesthesia

For pain management tramadol (Altadol, Formevet, Italy) at a dosage of 10 mg/kg was orally administered to the patient 30 min before anaesthetic cream application. The patient was manually restrained and placed on an electric heating pad kept at 37.5 °C. The prolapsed penis was gently cleaned with saline (0.9% NaCl, S.A.L.F. SpA, Italy) to wash out all the debris and disinfected with 0.05% povidone-iodine (7.5% Betadine[®], Mundipharma AG, Switzerland). Lidocaine/prilocaine cream (EMLA[®] cream 5%, AstraZeneca SpA, Milan, Italy) at a dose of 1g/10 cm² was applied on the penile mucosa (Plate III, Fig. 2). Selected clinical indicators were continuously recorded including the loss of the tail and hind limb withdrawal reflex, the loss of response to pinching the mucosa of the prolapsed penis with forceps, and the restoration of the tail and hind limb withdrawal reflex. The time interval from lidocaine/prilocaine application to the loss of the hind limb withdrawal reflex, and the response to penile mucosa pinching was recorded as the induction time for surgical anaesthesia; the time interval from lidocaine/prilocaine application to the full restoration of the tail and hind limb withdrawal reflex was recorded as the recovery time.

Surgery

When surgical anaesthesia was reached, the prolapsed penis was clamped near its base with haemostat forceps and 2–3 ligations with absorbable suturing material (Vicryl 4-0, Johnson and Johnson) were placed at the base of the penis. The prolapsed engorged organ was transected with Metzenbaum scissors or scalpel blade distally to the sutures. Antibiotic ointment with tobramycin (0.3% Tobral[®], Alcon, Milan, Italy) was applied topically on the penile stump. After surgery patients received 5 mg/kg of tramadol administered orally.

Results

In two male Hermann's tortoises the response to pain stimuli persisted for more than 20 min after lidocaine/prilocaine cream application and anaesthetic cream had to be re-administered. After this second application of lidocaine/prilocaine cream, surgical anaesthesia was reached within 28 and 32 min, respectively (Table 1). After topical application of lidocaine/prilocaine cream on the penile mucosa, surgical anaesthesia was reached within 19.22 ± 4.36 min. Full recovery of the tail and hind limb withdrawal reflex and the full response to pinching was recorded at 40.83 ± 7.68 min after

Table 1. Anaesthesia with tramadol and lidocaine/prilocaine in male chelonians.

Species	Body weight (kg)	Induction time for surgical anaesthesia (minutes)	Recovery time (minutes)
<i>Trachemys scriptas cripta</i>	0.33	15	30
<i>Trachemys scripta elegans</i>	0.23	16	34
<i>Trachemys scripta scripta</i>	0.32	18	36
<i>Testudo hermanni</i>	0.36	19	38
<i>Pelomedusa subrufa</i>	0.26	17	47
<i>Trachemys scripta elegans</i>	0.37	16	32
<i>Testudo hermanni</i>	0.41	20	44
<i>Testudo hermanni</i>	0.52	19	52
<i>Testudo hermanni</i> *	0.40	28	42
<i>Testudo hermanni</i>	0.36	20	35
<i>Testudo hermanni</i> *	0.37	32	41
<i>Testudo hermanni</i>	0.66	20	46
<i>Trachemys scripta scripta</i>	0.22	18	42
<i>Graptemys pseudogeographica kohnii</i>	0.16	16	29
<i>Trachemys scripta scripta</i>	0.22	15	43
<i>Testudo hermanni</i>	0.51	17	37
<i>Stigmochelys pardalis</i>	10.2	20	61
<i>Testudo hermanni</i>	0.62	20	46
Mean	0.941	19.22	40.83
SD	2.329	4.36	7.68
Minimum	0.15	15	30
Maximum	10.2	32	61

*In two Hermann's tortoises the lidocaine/prilocaine cream had to be re-administered.

lidocaine/prilocaine application. In all 18 male chelonians the surgical treatment of prolapsed penis was uneventful as checked on two follow-up days (7 and 30 days after surgery).

Discussion

Results of this study demonstrate the topical treatment with lidocaine/prilocaine cream as a feasible form of local anaesthesia for the surgical treatment of prolapsed penis in chelonians. A number of other anaesthetic protocols for penile/cloacal surgery in chelonians were published (Raiti 1995; Harkewicz 2002; Barten 2006), including local anaesthesia (Mans et al. 2011a, b; 2013; Rivera et al. 2011). Administration of 2% lidocaine into the intrathecal space at the level of the proximal coccygeal vertebrae proved to be a feasible and effective technique for induction of spinal anaesthesia in chelonians. Complete motor block of the cloacal sphincter, tail and hind limbs was induced in 57–83% of all terrapins after one or two injections. The mean onset time and duration of complete motor block of the hind limbs, tail and cloaca were 2.8 ± 3 and 76 ± 46 min, respectively (Mans et al. 2011a,b; 2013). However, intrathecal administration is a special technique which needs practical experience. The method of topical anaesthesia with lidocaine/prilocaine cream is safe for the chelonian patient and easy for the clinician. Results of this study showed that the combination of oral tramadol analgesia management with topical application of lidocaine/prilocaine cream on the mucosa is a feasible method of surgical anaesthesia for male chelonian patients with penile prolapse.

Acknowledgements

The project received partial funding from the Faculty of Veterinary Medicine of the University of Veterinary and Pharmaceutical Sciences, Brno (Institucionální výzkum FVL-2014).

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Fig. 1. Penile prolapse in an African helmeted terrapin (*Pelomedusa subrufa*)



Fig. 2. Lidocaine/prilocaine cream application on penile mucosa of Hermann's tortoise (*Testudo hermanni*)