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RESEARCH PAPER

Assessment of maxillary and infraorbital nerve blockade for rhinoscopy in sevoflurane anesthetized dogs

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Abstract

Objective To investigate the efficacy of maxillary and infraorbital nerve blocks for prevention of cardiovascular and qualitative responses to rhinoscopy, as well as response to skin clamping after assigned nerve block placement.

Study design Randomized, blinded, placebo-controlled cross-over experimental study.

Animals Eight random-source mixed breed dogs > 1 year old and weighing between 13 and 22 kg.

Methods Within three anesthetic episodes, separated by at least 3 days, dogs were assigned to receive either 1 mL lidocaine 2% maxillary nerve block (ML); 0.5 mL lidocaine 2% infraorbital nerve block (IOL); or equal amounts of saline for maxillary or infraorbital nerve block combined as control treatment (S). Monitoring included temperature, respiratory rate, end-tidal CO_2, ECG, heart rate (HR), systolic, diastolic and mean arterial pressure (SAP, DAP, MAP). Posterior (pR) and anterior rhinoscopies (aR) were performed and scored. Differences from baseline for outcome parameters HR, SAP, DAP, MAP were analyzed using repeated-measures ANOVA, and results reported as mean ± SD. Binary scores for rhinoscopy were analyzed using logistic regression, and odds ratio was reported.

Results Changes from baseline for HR and SAP were significant for all treatments, besides ML for pR. Difference in changes from baseline among treatments was statistically significant for HR during pR with ML < S, and for SAP, DAP and MAP in right and left aR with ML < S and IOL > ML, except for DAP in left aR with only IOL > ML. Analysis of the binary score showed that the probability of a response for S and IOL treatments was nearly triple that of the ML treatment. None of the dogs, regardless of the treatments applied, responded to skin clamping.

Conclusion and clinical relevance Cardiovascular parameters do not seem to reflect the occurrence of adverse reactions during rhinoscopy. The maxillary nerve block is superior to the infraorbital nerve block, as applied in this study, in preventing adverse reactions during posterior rhinoscopy.

Keywords dog, infraorbital nerve, lidocaine, local anesthesia, maxillary nerve, rhinoscopy.

Introduction

Rhinoscopy is commonly used to examine the nasal and pharyngeal areas in small animal medicine (Lent & Hawkins 1992). Complete rhinoscopic evaluation consists of anterior rhinoscopy where the endoscope is introduced through the nares and directed caudally; and posterior rhinoscopy where the endoscope is introduced through the oral cavity and retroflexed around the soft palate. Common adverse reactions during rhinoscopy include violent

sneezing, gagging, and head movement. All of these can interfere with the procedure, cause nasal and oral injury, or possibly damage the instrument. To achieve a thorough examination in dogs, a deep plane of anesthesia is indicated (Noone 2001; Weil 2009) and high concentrations of volatile anesthetic agents may be required for maintenance of anesthesia. Modern inhalant anesthetics cause dose-dependent cardiovascular depression (Lowe et al. 1996), which can result in hypotension, a common complication during general anesthesia (Gaynor et al. 1999; Mazzaferro & Wagner 2001). Administration of opioids, sedatives, tranquilizers, and local anesthetics can be used as adjuncts to general anesthesia to reduce the amount of inhalant anesthetic required (Muir et al. 2003; Valverde et al. 2004). Regional anesthesia is an alternative to systemic administration of adjunct drugs, providing desensitization of the area of interest without causing systemic effects. In humans, the placement of an infraorbital nerve block prior to endoscopic endonasal maxillary sinus surgery resulted in decreased consumption of isoflurane, less pain intensity, and more stable blood pressure (Higashizawa & Koga 2001). In dogs, the maxillary and the infraorbital nerve blocks are frequently performed to provide analgesia for tooth extraction or surgery of the maxilla (Duke 2000; Beckmann & Legendre 2002; Reuss-Lamky 2007). Based on anecdotal information, the use of either nerve block to facilitate rhinoscopic procedures is widely practiced, but the examiners perception of efficacy is highly variable and might be explained by differences in the procedure (anterior versus posterior rhinoscopy) as well as differences in area of innervation among maxillary and infraorbital nerves. In dogs, the maxillary nerve is a branch of the trigeminal nerve and contains primarily sensory fibers. The nerve exits the cranium through the *fissura orbitalis*, crosses the pterygopalatine fossa to enter the infraorbital canal. The maxillary portion innervates the soft and hard palates, the maxilla, the teeth of the maxilla, the nose, and the upper lip (Budras et al. 2007). It can be blocked percutaneously by placing a needle ventral to the zygomatic arch at a 90° angle, approximately 0.5 cm caudal to the lateral canthus of the ipsilateral eye. The needle is advanced in a rostral direction in close proximity to the pterygopalatine fossa (Duke 2000; Skarda & Tranquilli 2007). As the cranial extension of the maxillary nerve, the infraorbital nerve runs through the infraorbital canal to innervate the premolar, canine and incisor teeth of the maxilla and the surrounding soft tissues (Budras et al. 2007). The infraorbital nerve block is performed by inserting a needle into the infraorbital canal or in close proximity to the infraorbital foramen (Duke 2000; Beckmann & Legendre 2002; Reuss-Lamky 2007). The needle can be inserted from inside the mouth or percutaneously.

To the authors' knowledge, the efficacy of the maxillary and the infraorbital nerve blocks have not been evaluated for prevention of adverse reactions during rhinoscopy in dogs. The objectives of this study were to evaluate the efficacy of the maxillary or the infraorbital nerve blocks using 2% lidocaine for prevention of cardiovascular and qualitative (physical) responses to rhinoscopy in dogs anesthetized with sevoflurane. A second objective was to qualitatively evaluate the dogs' response to skin clamping after the placement of the maxillary or infraorbital nerve blocks during sevoflurane anesthesia.

We hypothesized that the maxillary nerve block would prevent adverse reactions during anterior and posterior rhinoscopy, whereas the infraorbital nerve block would prevent adverse reactions during anterior rhinoscopy only. For the second objective we hypothesized that animals would not react to clamping of the skin after the placement of the infraorbital or maxillary nerve block with 2% lidocaine.

Materials and methods

Animals

Eight healthy adult dogs (five males and three females; seven mixed breed and one beagle) were used in this prospective study. All dogs were older than 1 year and weighed between 13 and 22 kg. Dogs were considered to be healthy based on physical examination, packed cell volume (PCV) and total solids (TS). Dogs were housed individually in approved facilities, fed a standard commercial diet and had access to water *ad libitum*. The study was approved by the local Institutional Animal Care and Use Committee (IACUC).

Study design

The study was conducted in a blinded, randomized, crossover placebo-controlled experimental design. Randomization was done by lottery, drawing the treatments out of a hat. All treatments were written on a separate piece of paper, i.e. 8xML, 8xIOL, 4xMS

