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STUDY OF THE MORPHOLOGICAL BASIS IMPLICATED IN INHALATION ANAESTHESIA AT DOGS: A PERSONAL RESEARCH

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Abstract

The study presents one of anesthesia techniques, the inhalation anesthesia, frequently used in veterinary medicine. The tested substance is a general anesthetics whose role is to act selective or at global mode, above one kind of structures form central nervous system, producing specific effects for his team.
There have been observed the anesthetic effects of Izofluran dosed through mask induction and maintained with tracheal sonde at 5 dogs from different species and weights on a private clinic.
There have been recorded the hematological and biochemical values of every patient, and also evaluated the vital constants: cardiac frequency, respiratory frequency, temperature, induction time, wake up time, metabolisation time and seconds products eliminating. There have been monitored the effects on cardiovascular, respiratory, neuromuscular, renal systems and live. In order to find the best inhalator there have been made comparative tests between Izofluran and Sevofluran.
After inhalation administration of Izofluran it was observed a nesemnificative clinical grow of enzymatic activity for aminotransferase (GOT/AST), alaninaminotranferase (GPT/ALT), gama glutamil transferase (GGT), total amylase, glycaemia, creatinine, urea and compared with initial moment. There were not recorded major differences between initial moment and after anesthesia. The steps of anesthesia have characterized through induction of anesthetic in one moderate time (10-15 minutes) with respiratory complications (apnea, larynx spasm and cough), passing from anesthesia was done in 15-25 minutes.
Secondary reactions (vomit, convulsions or events) were not present at anesthetized cases with Izofluran, and the temperature, cardiac frequency, respiratory frequency and oxygen saturation of peripheral tissues were on normal parameters. The phases of anesthesia have been characterized with a longer time of induction and waking up against Sevofluran with some respiratory complications.

Key words: *izofluran, anesthesia, intubation, dog, enzymes.*

INTRODUCTION

The anesthesia represents a medical procedure which decreases or suppresses, completely or partially, the organism′s sensitivity, by chemical substances called anaestethics. The anesthesia is used throughout surgical procedures to allow animals to bear the surgical intervention, with minimal painful effects. The anesthesia is taking place when one or more types of sensitivity disappear and when sensitivity is reversibly abolished, by using anaesthetics.
The general anesthesia consists in the reversible loss of consciousness. The general anesthesia is realized through three types of actions: narcosis (which represents the loss of consciousness), by reason of the administration of an inhalation anaesthetic (sevoflurane, isoflurane, halotane) or intravenous; analgesia (the disparity of pain), obtained through the administration of analgesics; curarisation (paralyzing substances), that allow the muscles to relax, in order to have a good consecution of the surgical intervention.
The morphologic base implicated in the inhalation anesthetics is represented by the respiratory system, with intrapulmonary and extrapulmonary tracts, and their integrity is contributing in a great way in the good consecution of the phases of narcosis and in the wakening process (Ang et al, 1998).

MATERIALS AND METHODS

Previous published results suggested the procedure of anaesthetic administration (Tacke et al., 1998, Topal et al., 2003, Yuan et al., 2012). We have followed the anesthetic effects of Isoflurane, administered through mask induction and maintained through endotracheal

intubation with a flexible plastic tube, in five dogs of different size and breed (in the age interval of 2-12 years, three males and two females, two of European breed, two poodles and one bichon), in a private clinic. The surgical interventions they underwent did not have a great ampleness and their duration did not exceed 70 minutes. Each patient received the same premedication.

On each case were recorded the hematological and biochemical values, and we evaluated the vital constants: the cardiac frequency, the oxygen saturation of the peripheral tissues, the induction time, the wakening time, the metabolisation and secondary waste products elimination. The effects on the cardiovascular system, respiratory, neuromuscular and renal systems and the liver were also monitored.

The anesthesia circuit that we used for the experiment is a closed circuit, which is made from a system of tubes that ensure the oxygen input and the elimination of carbon dioxide, that is absorbed by a conventional soda lime, thus creating the artificial ventilation. In the enclosed circuit, the gaseous blend is reinhalated, thus ensuring an adequate oxygen level. This method has the advantage that it needs a small amount of volatile anesthetic substances, it realizes a deep narcosis that has a controllable duration and has the possibility of controlling the pulmonary ventilation. The endotracheal intubation was realized as we′ll see next:

- we opened the mouth;
- we have visualized the epiglottis in the laryngeal opening and we have exteriorized the tongue and applied the laryngoscope at the base of the tongue;
- the head of the animal was fixed in an orthopnea position, to reduce as much as possible the orotracheal angle, and then the flexible plastic tube was inserted up to the anterior third of the trachea. The protrusion of the tube up to the trachea was visualized also in the radiography.
- the flexible tube has a plastic bubble that, when air is inserted, remains fixed in the windpipe; the air is inserted into the plastic bubble with the use of a syringe and the exterior end of the tube was closed (it needs to be closed if the plastic tube doesn′t have an automatic valve);
- to check that the plastic tube is correctly positioned into the trachea (there is a risk that, if the intubation is made under difficult conditions, the plastic tube may be accidentally inserted into the esophagus), we proceeded to the auscultation of the lungs with the stethoscope after an insufflation with the balloon. The vesicular murmur and the thoracic distension once the air was insufflated confirmed that the plastic tube was correctly inserted;
- the plastic flexible tube was connected on to the anesthetic circuit and narcosis was induced;
- the tube was fixed to the animal′s jaw, to prevent the intratracheal movement of the tube and to avoid tracheal lesions.

Figure 1. Visualization of the tracheal opening

Figure 2. Radiological visualization of the endotracheal plastic tube

Figure 3. Monitoring the patient's vital signs

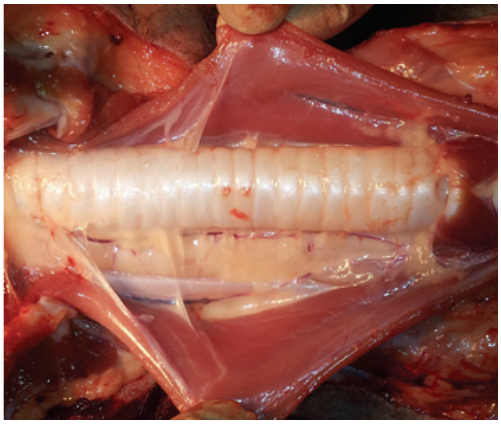

Figure 4. The dissection of the ventral region of the neck

RESULTS AND DISCUSSIONS

After the inhalation administration of the Isoflurane, we noticed: an insignificant growth of the enzymatic activity of the aspartate amino-transferase (GOT/AST), alanine amino-transferase (GPT/AST), gamma glutamil-transferase (GGT), the total amylase, glycaemia, creatinine and urea above the initial determination. Comparing Isoflurane with Sevoflurane, in the case of Isoflurane, the enzymatic activity is higher.

The phases of anesthesia were characterized by induction of the anesthesia in a moderate time (15-20 minutes), with some noticeable respiratory complications (apnea, laryngeal spasm, coughing), the wakening took 15-25 minutes. The minimal alveolar concentration (MAC) of the Isoflurane is about 1,5 %, according to the animal's weight and body structure, lower than Sevoflurane; it is lower in older patients in which a larger amount of anaesthetic administered for a longer period of time produces a respiratory depression faster than in a younger organism.

The accentuation of the depth of the anesthesia allows endotracheal intubation without using muscle relaxants. The smell, that is irritating and stinging, allowed mask induction in a higher rate of the respiratory complications (apnea, abolition of the respiration, laryngeal spasm and coughing) than Sevoflurane. Thus, the smell slowly affects induction.

The rapid growth of the alveolar inspiratory concentration with Isoflurane is translated by a fast anesthetic induction. The frequency of salivation, stopping of the breathing, laryngeal spasm, are easily increased than in Sevoflurane and are controllable. The anesthesia induction was realized by increasing the inspirited concentration of Isoflurane, the induction time was shorter without complications (cardiac and respiratory), using a high concentration, the technique of the prepared circuit (primed circuit), comparing with an conventional method of progressive induction.

By using practical tests, we have demonstrated the fact that the substance rapidly enters the system, after an inhalation administration, and after the administration is stopped, the blood concentration of the anesthetic has quickly decreased.

We have attempted to demonstrate that there is a certain nephrotoxicity and a liver toxicity in the case of using Isoflurane. According to the physical and chemical data, the organism biotransformation of the Isoflurane is reduced, but larger than Sevoflurane. Approximately 0.25% of the administered quantity is found as metabolites, most of them are excreted by the kidneys as trifluoroacetic acid and fluorine. These metabolites, when are found in a great plasmatic concentration, may become nephrotoxic, by changing the renal perfusion.

From point of view of nephrotoxicity and liver toxicity, the pre- and post-surgery biochemical tests have demonstrated that the renal and liver function where unaffected in canines.

Like any other inhalation anaesthetic, a large blood concentration of Isoflurane determines a respiratory depression and a an increase in the partial arterial pressure of CO_2.

CONCLUSIONS

In the dogs that were anesthetized using Isoflurane, there were no side effects (vomiting, seizures, agitation) and the temperature, cardiac frequency, respiratory frequency and the oxygen saturation of the peripheral tissue were normal.

The inhalation anesthesia did not modify the postop blood parameters.

The respiratory elimination of the anaesthetic allows a better control of the anesthesia and a rapid wakening in case of any complication.

The pleasant, yet acrid and irritating smell allows mask induction and intubation without the use of muscle relaxants, but with weaker effects than Sevoflurane.

We have noticed that the side effects on organs and systems are minimal.

The side effect metabolites fluorine based that have a great plasmatic concentration may influence the renal function in a negative way.

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