COMPARISON OF ISOFLURANE INHALATIVE ANAESTHESIA, INJECTION ANAESTHESIA AND HIGH VOLUME CAUDAL EPIDURAL ANAESTHESIA FOR UMBILICAL SURGERY IN CALVES; METABOLIC, ENDOCRINE AND CARDIOPULMONARY EFFECTS

Jenny Offinger¹, Henning Meyer¹, Jessica Fischer¹, Sabine B.R. Kästner², Jürgen Rehage¹

¹Clinic for Cattle, ²Small Animal Clinic, University of Veterinary Medicine Hannover, Hannover, Germany

Objective: To compare three different anaesthetic protocols for umbilical surgery of calves.

Methodology: Thirty healthy German Holstein calves were included in this prospective, randomised, experimental study. All calves underwent a standardised umbilical surgery after allocation to one of three anaesthetic regimes: The inhalation-group (INH) received isoflurane inhalative anaesthesia after xylazine and ketamine sedation (0.1 and 2.0 mg kg⁻¹; respectively), the injection-group (INJ) was treated with 0.2 mg kg⁻¹ xylazine and 5.0 mg kg⁻¹ ketamine, redosed every 10-15 min with half of the initial dose, while the epidural-group (EPI) was treated with a high volume caudal epidural anesthesia consisting of 0.2 mg kg⁻¹ xylazine, diluted to a final volume of 0.6 ml kg⁻¹ lidocaine. The endocrine stress response was determined through the analysis of norepinephrine (NE) and cortisol levels before induction, at regular intervals during the operation and for up to five hours after completion of surgery. A visual analogue scale (VAS) was applied to monitor intraoperative pain. At the same time, cardiopulmonary variables and blood gases were measured.

Results: Cortisol and NE-levels were significantly lower in EPI compared to INH and INJ. The highest VAS-scores were recorded for INJ, followed by the EPI and INH. Oxygen saturation (SaO₂) in INJ was significantly decreased during surgery, reaching levels of 84 %. In contrast, SaO₂ in INH was significantly increased, while SaO₂ in EPI remained entirely within physiological boundaries. Intra-operatively, calves of INH and INJ developed depressed levels of arterial pH and elevated levels of partial pressure of carbon dioxide, mean arterial blood pressure and systemic vascular resistance, yet values of BE and HCO₃⁻ remained unchanged. Calves of EPI showed the least amount of intraoperative alterations in cardiopulmonary parameters.

Conclusions: High volume caudal epidural application of xylazine and lidocaine in combination with periumbilical infiltration of lidocaine and pre-emptive application of flunixin-meglumine provided a practical, inexpensive and safe anaesthetic protocol for calves undergoing umbilical surgery. Thus, for uncomplicated umbilical surgery, high volume caudal epidural anaesthesia can be promoted as an alternative to inhalation anaesthesia and should definitively be regarded as superior to injection anaesthesia regarding cardiopulmonary side effects and analgesic quality.