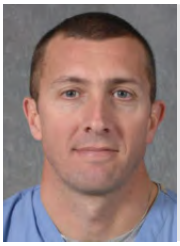

Anesthesia in the field. What is possible?

Martin Suarez DVM, MS
Assistant Professor Anesthesiology
College of Veterinary Medicine
Washington State University

Equine anesthesia has always been associated with greater patient risk compared to other common domestic species. Understanding of the unique factors associated with equine anesthesia compared to other species is the first step in improving patient safety. The risk of anesthetic mortality is greater in equine species than other domestic animals. Studies have reported rates between 0.24% and 1.6% for horses compared to dogs (0.05%) and cats (0.11%).

General considerations
Inducing recumbency in horses from the standing position can be dangerous. To minimize the risk, appropriate sedation and muscle relaxation should be administered prior to induction. Size is a factor in determining peripheral (skeletal muscle) perfusion. The risk of postanesthetic neuropathy and myopathy is higher in equine patients, particularly draft and large warmblood breeds. The goal for most adult horses should be to maintain a mean arterial blood pressure above 70–80 mmHg. Appropriate padding is always recommended but not always possible during field anesthesia. Recumbency can also lead to Ventilation/perfusion mismatch which is more remarkable on the equine patient.

Pre-operative considerations
Some factors like age, type of surgical procedure, drug choice, and duration of anesthesia can increase the mortality risk of the anesthesia. To prevent complications during anesthesia, every patient should have a complete physical exam performed prior to induction. The physical exam should be focused in the cardiovascular and respiratory systems. It is also important to obtain a complete medical history of each patient. Whenever possible, pre-operative blood work should be submitted to evaluate overall health of the patient. Fasting of solids for 8hr prior anesthesia has been suggested to prevent distension of the abdomen that causes hypoxia. Another important point is to thoroughly flush the oral cavity of the horse prior to induction to minimize the risk of bacterial contamination of the lower airway during the endotracheal tube placement.

Field anesthesia
Total intravenous anesthesia (TIVA) a technique of general anesthesia that is performed using a combination of agents given solely by the intravenous route. TIVA is probably the most practical way to anesthetize horses on field conditions. A key point is the lack of need for an anesthetic machine which makes the use of TIVA very applicable to field anesthesia. In general, there is better cardiovascular function and a smoother recovery because horses undergoing TIVA anesthesia are not exposed to inhalant gases. Some potential disadvantages of this technique include drug accumulation in the animal's system and whenever prolonged infusions are used, a build-up of active metabolites may occur. In addition, this technique is not suitable for prolonged anesthesias.

The ideal drugs selected for TIVA should have pharmacokinetic properties that are not cumulative when infused into horses for prolonged periods. Unfortunately, the ideal injectable anesthetic drug does not exist, and a combination of multiple drugs is often necessary.

Usually, the are two methods of drug administration. Intermittent administration (top-ups) of injectable anesthetics can lead to a variable depth of anesthesia due significant changes in the plasma concentration being outside of the therapeutic range. The result is an inadequate depth of anesthesia.

To minimize variation within plasma concentrations a continuous administration (CRI-constant rate infusion) of a drug usually results in a more stable plasma concentration.

Common protocols for providing anesthesia to horses under field conditions include combinations of ketamine and an α2-adrenergic receptor agonist. The combination of guaifenesin, ketamine, and xylazine (often referred to as 'triple drip') has been described when intravenous maintenance of anesthesia is needed for 1 hr approximately procedures. Commonly used TIVA protocols in equine practice.

Sedation dose (IV) (mg/kg)	Induction dose (IV) (mg/kg)	Maintenance
α2 agonist Ketamine		
Xylazine 1.0–1.5	Ketamine (2.0–2.5) ± Diazepam/midazolam (0.02–0.1)	Re-dosing: ⅓-½ of initial dose of xylazine and ketamine every 10 minutes.
Detomidine 0.01–0.02 or Romifidine 0.08–0.12	Ketamine (2.0–2.5) ± Diazepam/midazolam (0.02–0.1	Re-dosing: ⅓-½ of initial dose ketamine every 10 minutes. ⅓-½ of initial dose α2 agonist every 15–20 minutes.
2 agonist + Ketamine + Guaifenesin (Triple Drip)		
Xylazine 1.0–1.5 or Detomidine 0.01–0.02 or Romifidine 0.08–0.12	Ketamine (2.2) ± Diazepam/midazolam (0.02–0.1)	Guaifenesin (5%), 0.5–1 L. Ketamine (2 g). Xylazine (500 mg)/or Detomidine (20 mg)/or Romifidine (50 mg). Infuse at a rate of ~2–3 mL/kg/hr. Dose rate needs to be adjusted to effect over time.

Monitoring

Intubation and availability of supplemental oxygen are prudent during triple drip anesthesia. Respiratory depression and bradycardia may occur during administration of triple drip, hence respiration and heart rate should be monitoring closely during anesthesia. Monitoring consciousness and the depth of anesthesia is the key to a safe anesthetic practice. Monitoring depth of anesthesia, respiratory rate, mucous membrane color and perfusion time, and arterial blood pressure is of particular importance. Monitoring of the pulse should be performed at regular intervals. This is easily achieved by palpating the transverse facial artery (located in proximity of the zygomatich arch) or the facial artery (as it turns around the mandibular bone). Heart rate is easily determined with a stethoscope, but stroke volume is not easily obtained under field conditions.

Non-invasive arterial blood pressure determination is easily accomplished in the field with the development of hand-held pressure monitors. A better, more accurate method is the use of doppler-ultrasonic, also an easy and practical method for the determination of blood pressure. The doppler crystal can be placed over the coccygeal artery. A cuff is placed around an extremity of the tail. The cuff is inflated to a preset pressure that excess the systolic arterial pressure and then slowly released. The pressure at which the audible flow signal returns it is considered the systolic blood pressure. Normal systolic blood pressure values in an anesthetized horse range from 90-120 mmHg.

Respiratory rate should be closely monitored in the anesthetized patient. The normal respiratory rate of a anesthetized adult horses ranges between 5 and 15 breaths/min. Abnormalities such as obstruction, apnea or an increase in rate should be corrected immediately. Signs of a light anesthesia plane include an increase in respiratory rate and depth and increased activity of the eyeball. During a light anesthesia plane the effect of the alpha two agonists may make not significant changes in heart rate.

Horses undergoing TIVA using ketamine will appear lightly anesthetized, often with a brisk palpebral reflex, occasional nystagmus, swallowing, and lacrimation.

Recovery

The quality of the recovery is negatively correlated with the duration of anesthesia.Usually when TIVA last less than 60 minutes the recovery is generally smooth and predictable. Prolonged infusions lead to accumulation of drugs, longer times to recovery, and a less predictable course of achieving the standing position.

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Martín Suarez, DVM
Graduated in the year 2003 DVM, University of La Plata, College of Veterinary Medicine, Buenos Aires, Argentina.
Master's of Science - University of Pretoria, South Africa. " Total Intravenous Anesthesia"
Anesthesia Residency, College of Veterinary Medicine, University of Tennessee, USA.
CURRENT POSITION: Anesthesia clinical instructor, College of Veterinary Medicine, Washington State University.

Balanced Anaesthesia

Luís Filipe Louro
EBVS® European Specialist in Veterinary Anaesthesia and Analgesia
RCVS Specialist in Veterinary Anaesthesia and Analgesia
DVM MSc PGCertVPS CertAVP(EL) CertAVP(VA) DipECVAA FHEA MRCVS
Veterinary Anaesthesia Consultancy Services
CVS UK Ltd
Liverpool, United Kingdom

In the context of maintenance of general anaesthesia using volatile anaesthetic agents, reducing their concentration in the anaesthetic circuit stands as a key principle to prevent and manage cardiopulmonary depression. However, contemporary volatile anaesthetics lack analgesic properties, making it challenging to decrease their concentration in the anaesthetic circuit during general anaesthesia maintenance, especially in painful procedures. Insufficient intra-operative analgesia can lead to intra-operative nociception, poor recovery quality from general anaesthesia and post-operative pain. To address this challenge, incorporating supplementary systemic anaesthetics/analgesics can effectively reduce the dependence on volatile anaesthetics. This approach, known as balanced anaesthesia, not only mitigates the reliance on volatile anaesthetics but may also improve cardiovascular function, quality of recovery from general anaesthesia and intra- and post-operative pain management.

As already mention, balanced anaesthesia involves administering a combination of anaesthetic and analgesic agents to achieve the desired depth of anaesthesia and appropriate analgesia while minimising adverse effects of individual drugs. This strategy aims to attain the anaesthesia triad: hypnosis, analgesia, and muscle relaxation, all while ensuring that proper cardiorespiratory function is maintained (Bettschart-Wolfensberger & Larenza, 2007).

In the domain of equine anaesthesia, balanced anaesthesia protocols commonly entail the administration of both volatile and injectable anaesthetics and/or analgesic agents during the maintenance phase. This is also referred to as partial intravenous anaesthesia (PIVA). While balanced anaesthesia facilitates a lighter plane of anaesthesia due to the analgesic and relaxation properties of injectable agents, it can potentially increase the risk of awareness, a phenomenon hard to ascertain in veterinary patients.

PIVA has gained popularity among equine anaesthetists, as evidenced by the increasing number of related publications. Preliminary findings from the latest Confidential Enquiry into Perioperative Equine Fatalities (CEPEF-4) show a trend towards using volatile anaesthetics in combination with intravenous constant rate infusions (CRI) for PIVA. Among 6,000 inhalant-based general anaesthetics, 3,718 utilised PIVA (62%), compared to 2,282 (38%) using pure inhalation anaesthesia (Gozalo-Marcilla et al., 2021). Common drugs administered during PIVA protocols in horses include lidocaine, ketamine, opioids, and α2-adrenoceptor agonists (Gozalo-Marcilla et al., 2014, 2015).

Systemic lidocaine administration offers intraoperative analgesia and dose-dependent reduction in volatile agent requirements. Noted adverse responses to monitor for include central nervous system (CNS) toxicity, which can lead to ataxia during the recovery phase. Ketamine, administered at sub-anaesthetic intravenous doses, provides analgesia and decreases anaesthetic requirements, albeit requiring caution to avoid excitement during recovery due to accumulation of norketamine. Systemic full μ-opioids are justifiable for analgesia, despite debates about their inconsistent minimum alveolar concentration reduction and potential side effects. These days, α2-adrenoceptor agonists have gained significant popularity across diverse clinical contexts and have largely supplanted lidocaine, ketamine and opioids in PIVA protocols used to anaesthetise healthy patients undergoing routine surgical procedures. This shift can be credited to their notable contribution to better recovery quality from general anaesthesia. While cardiovascular effects of these agents raise concerns, appropriate CRI dose rates of short-acting drugs like xylazine, medetomidine, and dexmedetomidine can mitigate risks.

This presentation aims to critically review existing literature, discussing the rationale and constraints of balanced anaesthesia in horses, stimulating discussion on PIVA recommendations for equine patients.

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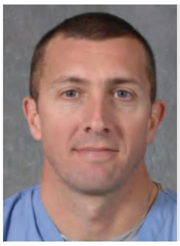
Luís Filipe Louro *graduated from Vasco da Gama University in Portugal. After several years working in first opinion and referral equine practice, Luís completed a 3-year residency programme in Veterinary Anaesthesia and Analgesia at the University of Liverpool. Subsequently, Luís joined Rossdales Equine Hospital and in the same year became a Diplomate of the European College of Anaesthesia and Analgesia. Currently, Luís works for CVS Referrals Division and Veterinary Anaesthesia Consultancy Services providing Equine Anaesthesia and Analgesia consultancy in various equine hospitals in the UK, Ireland and France. A keen clinical researcher, Luís' interests include foal anaesthesia, pain management and recovery quality in horses.*



Anesthetic management of foals during common surgical procedures.

Martin Suarez DVM, MS
Assistant Professor Anesthesiology
College of Veterinary Medicine
Washington State University

The neonatal period is generally classified as the first four weeks of life and is a period of very rapid physiologic change and adaptation, particularly in the cardiovascular, respiratory, immune, and neurologic systems. Foals younger than 1 month have an increased risk of anesthetic-related death (seven times higher than that of an adult horse) and complications. At 1 to 4 months of age the risk level decrease but there is still immature anatomy. Common procedures that require anesthesia include angular limb deformities, abdominal surgery, endoscopy, umbilical hernia, ribs fractures, umbilical infections, etc. General anesthetic considerations will be mentioned.

Respiratory system of the neonatal foal
Pulmonary changes occur during the first few hours but the most important changes to the adult circulatory system take 48–72 hours. Expansion of the lungs results in increased pulmonary blood flow, closure of foramen ovale, and closure of the ductus arteriosus.

Foals have an increased respiratory rate in comparison with adult horses and the chest wall compliance is greater too. PaO_2 values are low (75 mmHg) by 4 h after birth. However, adult values are not achieved for about 7 days. $PaCO_2$ values are 50 mmHg in the first hour of life and decrease thereafter. Hypoxia (oxygen saturation <95%), hypercapnia, and acidosis may be common in these patients under anesthesia. The administration of oxygen is always recommended.

Cardiovascular system
Foals have a higher average heart rate and a lower MAP compared with adult horses. Contractility of the heart ventricular compliance are limited. Adequate heart rate is important to maintain cardiac output and blood pressure when a patient is under general anesthesia. The sympathetic system and baroreceptors are also immature.

Thermoregulation
Neonatal foals are prone to heat loss under general anesthesia because of a lack of involuntary muscle activity (e.g., shivering) caused by the anesthesia. The attempting to thermo-regulate also contribute to the development of hypoglycemia and increase in oxygen consumption.

Fasting
It is unclear whether this is beneficial. In general, the neonatal foal should be allowed to suck up to the time of anesthesia induction. Older foals, on solid food, may have food withheld from 4–6 hours.

Sedation
The mare and foal if possible, should be kept together as long as the foal is conscious to avoid fear. Mares could also be sedated if necessary. Foals are very needle-shy and it is easy to accidentally hit the carotid artery while attempting jugular puncture. Intradermal or subcutaneous local anesthesia makes jugular catheterization easier, and IM sedation in older foals can be useful. To prevent hypothermia and hypoglycemia,

avoid keeping the neonatal foal sedated for long periods. Diazepam/midazolam 0.05–0.1 mg/kg, IV, can be used. Alpha2 agonists should be used with caution (low doses to effect e.g., xylazine 0.2 – 0.5 mg/kg) in the very young. If possible, avoid the use of alpha 2 agonists in foals less than a week of age.

Induction
Ketamine (2–3 mg/kg, IV) with diazepam/midazolam (0.1 - 0.2 mg/kg IV) given slowly to effect ± a low-dose α2 agonist (depending on physical status and age).

Propofol (4 mg/kg, IV) given slowly to effect with or without prior sedation with a benzodiazepine.

Maintenance Agents
For short procedures (<30 minutes), maintenance of anesthesia may be provided with additional doses of injectable anesthetics such as propofol. Oxygen/ventilatory support may be necessary due to the respiratory depressant effects of the drugs combined with the foal's physiologic immaturity. For major surgical procedures or the need for prolonged anesthesia (>30 minutes), inhalant anesthetics isoflurane and sevoflurane are the mainstay. This requires tracheal intubation and the use of an anesthesia machine.

Analgesia
As part of a balanced anesthesia the administration of infusions or boluses of ketamine, lidocaine, α2 agonists, and/or opioids as adjuncts to inhalational anesthesia, it is always appropriate. Butorphanol is the most used opioid analgesic in horses. Foals, unlike adult horses, do not exhibit behavior effects when administered butorphanol, and neonatal foals become sedate. For analgesia, foals seem to need higher doses of butorphanol than do adults. In foals aged from 1 to 8 weeks, a butorphanol dose of 0.1 mg/kg, IV provided 150 minutes of analgesia in a thermal model of nociception. A dose of 0.05 mg/kg, IV was not associated with analgesia. The pure mu agonists, morphine and methadone, may be used at adult doses; thus, it would seem reasonable to assume that hydromorphone can also be used in foals at adult doses. However, PK/PD data on these drugs are limited in foals. Morphine (0.05–0.1 mg/kg, IV, IM). Methadone (0.05–0.1 mg/kg, IV, IM). Hydromorphone (0.02–0.04 mg/kg, IV, IM). NSAIDs dosing interval may be longer in foals than in adults. Flunixin in neonatal foals, dosages of 1.1 mg/kg, IV q 24–36 hours seem to be safe. For meloxicam a dose of 0.6 mg/kg, IV or orally q12–24 hours have been recommended.

Considerations for monitoring

- The electrocardiogram (ECG) should be displayed, and arterial blood pressure should be measured in all but the shortest anesthetic events. Blood pressure can be measured using non-invasive or invasive methods; however, the latter are more desirable and give a beat-to-beat display.
- A lower mean blood pressure (50 mmHg) appears to be acceptable in the neonate.
- Cardiac output is heart-rate dependent in foals; therefore, bradycardia (<50 beats/min) is generally unacceptable. Hypotension during anesthesia may be related to vasodilation, hypovolemia, bradycardia, and/or decreased contractility (decreased stroke volume). Treatment aimed at hypotension should be directed at an identified underlying cause.
- Ensure an adequate PaO_2.
- Maintain body temperature and normal blood glucose.
- Mechanical ventilation is commonly employed in anesthetized neonatal foals to maintain the $PECO_2$ in the normal range (35–45 mmHg). Tidal volumes are in the range 6–8 ml/kg. A respiratory rate of 12–25/minute is usually employed. The airway pressure should not exceed 12 cm H_2O.

Recovery
Foals should be kept warm in recovery, and excess moisture on the foal's coat should be removed (e.g. with a hair dryer). Most foals can be hand recovered without problem. A portable SpO_2 monitor applied to the tongue can be used to monitor hemoglobin saturation with oxygen.

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Martín Suarez, DVM
Graduated in the year 2003 DVM, University of La Plata, College of Veterinary Medicine, Buenos Aires, Argentina.
Master's of Science - University of Pretoria, South Africa. " Total Intravenous Anesthesia"
Anesthesia Residency, College of Veterinary Medicine, University of Tennessee, USA.
CURRENT POSITION: Anesthesia clinical instructor, College of Veterinary Medicine, Washington State University.

Post-operative analgesia

Luís Filipe Louro
EBVS® European Specialist in Veterinary Anaesthesia and Analgesia
RCVS Specialist in Veterinary Anaesthesia and Analgesia
DVM MSc PGCertVPS CertAVP(EL) CertAVP(VA) DipECVAA FHEA MRCVS
Veterinary Anaesthesia Consultancy Services
CVS UK Ltd

Liverpool, United Kingdom

In recent decades, significant advancements have taken place in modern equine anaesthesia, medicine and surgery, leading to highly sophisticated treatments and surgical techniques. Despite these notable advances, including the adoption of balanced anaesthesia protocols, multimodal analgesia, standing surgery, and minimally invasive techniques, specific surgical procedures unavoidably give rise to varying degrees of moderate to severe pain. Minimising pain in the peri-operative period remains pivotal to ensure animal welfare and promoting enhanced recovery, ultimately yielding improved treatment outcomes. However, effectively mitigating pain requires the ability to accurately identify it, which can present a more significant challenge (van Loon & Van Dierendonck, 2018).

The International Association for the Study of Pain (IASP) updated the definition of pain in 2020. The IASP defines pain as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage (Raja et al., 2020). Adding to this definition, six key notes were introduced by the IASP. The most relevant to the study of pain in animals was the recognition that verbal description is only one of several behaviours to express pain; inability to communicate does not negate the possibility that a human or a nonhuman animal experiences pain (Raja et al., 2020).

Pain assessment in humans benefits from their capacity to convey pain-related attributes such as quality, location, and intensity verbally. However, the utilisation of self-report is infeasible for pain assessment in horses. As a result, the evaluation and quantification of pain in horses and other animals rely upon the observer's capacity in discerning potential pain-associated alterations in both behavioural patterns and physiological parameters exhibited by the patient. In order to optimise the objectivity and consistency of pain assessment, it becomes imperative to undertake the following steps:

- Determine the specific behaviours and physiological parameters that may be indicative of pain.
- Systematise the observation of these indicative signs.
- Delineate the degree of pain correlation with specific behavioural manifestations.
- Integrate these empirical observations into a quantitative metric, facilitating the estimation of pain intensity over time.

This comprehensive approach aids in determining the potential requirement for analgesic intervention and enables the detection of treatment efficacy. The drive for objective pain assessment prompted the development of systematic evaluation through pain scales. These scoring systems must undergo validation tailored to the specific type of pain, considering factors like condition and duration (e.g., acute post-abdominal surgery).

When a horse is identified as being in pain or likely to experience pain following a surgical procedure, a well-structured pain management plan is essential. An effective analgesic plan includes a combination of systematically administered drugs along with locoregional analgesic techniques when feasible. The key lies in understanding the nature of potential pain, drug mechanisms, and their application to optimise pain relief (Elvir-Lazo & White, 2010). This approach results in a multimodal therapeutic plan that combines appropriate drugs and targets various aspects of the pain pathway. Common systemic administration routes involve intravenous or intramuscular injections for short-term relief, while oral medication is employed for more extended treatment periods. Although a combination of these routes is usually sufficient, alternative methods of drug delivery, such as transdermal, oral-transmucosal, epidurally or intra-articular can enhance analgesia for specific cases. When managing post-operative pain in horses, it is essential to formulate a "pain ladder" approach. This entails creating an individualised pain management plan that remains adaptable and follows a continuous cycle of plan–treat–evaluate. Cautiously monitoring the patient's response is integral for a successful post-operative pain management protocol.

Supplementary therapies, such as pharmacological and non-pharmacological methods to reduce stress during hospitalisation, along with practices like bandaging, attentive nursing, physiotherapy, farriery, and specific surgical interventions, are essential contributors to attaining positive outcomes in post-operative pain management.

The aim of this presentation is to present current evidence, examining both the benefits and obstacles of utilising pain scales in horses. Additionally, I will explore various pharmacological and non-pharmacological methods for pain management in horses during the post-operative period. The intent of this analysis is to initiate a dialogue regarding the compelling requirement for enhanced pain relief in equine care.

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Feeding and anaesthesia

Sheilah A Robertson, BVMS (Hons), CertVA, PhD, DACVAA, DECVAA, DACAW, DECAWBM (AWSEL), FRCVS.
Senior Medical Director Lap of Love Veterinary Hospice, Lutz, Florida, USA and Courtesy Professor, University of Florida, Gainesville, Florida, USA.

Historically, fasting times of up to 14 hours have been recommended before general anaesthesia in horses.[1] However, it is important to look at what lies behind those recommendations and ask if they are based on evidence or opinion. Hypotension and hypoxaemia are frequently encountered in anaesthetised horses. The theoretical benefits of fasting are reduced gastrointestinal contents which may enhance lung function (reduced pressure on the diaphragm, less negative impact on Functional Residual Capacity and less hypoventilation) and cardiovascular function (decreased pressure on major abdominal vessels) when horses are in dorsal recumbency but there is little evidence to support this. Dobromylskyj and colleagues reported no statistically significant differences in arterial oxygen tension ($PaO_{2)}$ during anesthesia in horses that had been kept off concentrate feed for an average of 16.6 hours and off hay for 10.6 hours compared to those that had access to concentrate and hay until 3.8 and 0.8 hours respectively before anaesthesia.[2]

In donkeys, a 5-hour fast showed no advantage over no fasting on arterial blood gas variables.[3]

Horses are browsers and may become stressed when fasted resulting in reduced gastrointestinal motility. After 12 hours of fasting, the intensity of gastrointestinal sounds and motility were significantly decreased (by up to 90%) in adult horses.[4] Fasting decreases myoelectric activity in the equine colon and therefore reduces contractile activity.[5] Decreased gastrointestinal motility is a risk factor of colic. Post-anaesthetic colic is an adverse event that results in increased morbidity, cost, hospitalisation time and mortality. It has been reported to occur in between 2.8 and 12% of horses that undergo general anaesthesia, and, in these studies, most horses were fasted for a minimum of 6-12 hours, as part of their pre-operative preparation. Senior and others reported a 5.2% prevalence of post anaesthetic colic in a multi-centre study.[6] In their study there was a trend for non-fasted horses to be more likely to develop colic after anaesthesia but the centre where the procedure was performed, and the type of surgery were also linked to the likelihood of post-anaesthetic colic occurring. The reasons for anaesthesia may play a role in the development of post-anaesthetic colic as only 1.5% horses undergoing magnetic resonance imaging developed colic compared to 7.1% of horses undergoing non-abdominal surgery.[7] Surgery and pain stimulate the sympathetic nervous system which results in decreased gastrointestinal motility but drugs given to horses undergoing surgery (e.g., antibiotics) may also play a role.[7] Bailey and others studied the incidence of post-anaesthetic colic in non-fasted horses that underwent elective anaesthesia for non-abdominal procedures.[8] In their study population the incidence of post-operative colic was 2.5% and they proposed that providing food may help maintain normal gastrointestinal motility and decrease the risk of post-anaesthetic colic.[8] Another adverse effect of fasting in horses is that their water intake will also decrease and reduced water intake is a risk factor for colic.[9] The role of stress should be considered in discussions because the use of muzzles (which most horses dislike) to prevent ingestion of solid feed was associated with more cases of post-operative colic than just "not feeding" horses before anaesthesia.[10]

An exception to allowing access to food before surgery is when the horse is scheduled for a laparoscopic procedure.[11] An empty or minimally distended gastrointestinal system allows for better visibility and less risk of perforation. A so-called laparoscopic diet should produce little gas and have a short transit time. Long, stem-rich hay is recommended in the days before surgery, with a fasting period of 24-26 hours.[11]

The literature does not support the idea that pre-anaesthetic fasting improves cardiopulmonary function in horses. The impact of fasting versus feeding before anesthesia on developing post-anaesthetic colic has less clear as many studies included multiple confounding factors. However, perusal of multiple studies along with clinical experience suggests that prolonged fasting is detrimental in horses. Access to hay (but restriction of grain) and allowing normal browsing activity may help maintain gastrointestinal motility and decrease post-anaesthetic colic and for most procedures this is now an acceptable strategy. Preparation for laparoscopic surgery is different and food restriction is advised. With respect to post-anaesthetic colic many other factors such as adequate pain control and decreasing stress must also be addressed.

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Dr Sheilah A Robertson BVMS (Hons), PhD, DACVAA, DECVAA, DACAW, DECAWBM (WSEL), CVA, MRCVS.

After graduating from the University of Glasgow Dr Robertson undertook specialized training in anesthesia and pain management. She earned her PhD from Bristol University in the United Kingdom for her thesis on the metabolic and hormonal changes associated with anesthesia and surgery in the horse. She has published extensively on the topic of equine pain and its alleviation and on the anesthetic management of horses and foals. She is board certified in anesthesia and in animal welfare by the respective American and European Colleges. She is the senior medical director of Lap of Love Veterinary Hospice, a large network of veterinarians dedicated to end-of-life care. Dr Robertson is also a courtesy Professor at the College of Veterinary Medicine, University of Florida, Gainesville, Florida.

Locoregional anaesthesia for surgical procedures

Luís Filipe Louro
EBVS® European Specialist in Veterinary Anaesthesia and Analgesia
RCVS Specialist in Veterinary Anaesthesia and Analgesia
DVM MSc PGCertVPS CertAVP(EL) CertAVP(VA) DipECVAA FHEA MRCVS
Veterinary Anaesthesia Consultancy Services
CVS UK Ltd
Liverpool, United Kingdom

It is well-documented that the risk of anaesthesia-related mortality in horses is considerably higher compared to dogs, cats, and humans. The preliminary findings from CEPEF-4 reported a mortality rate of 0.2% related to standing sedation in horses, in comparison to a 1% mortality rate for horses undergoing general anaesthesia (Gozalo-Marcilla et al., 2021). As anticipated, the occurrence of fatalities linked to standing sedation appears to be lower than that associated with general anaesthesia, highlighting the fact that standing sedation eliminates the mortality risk associated with recovery from general anaesthesia. As a result, there's a growing interest in performing surgery under standing sedation (Loomes & Louro, 2023) . This, along with a stronger focus on improving pain management in horses, has sparked a greater enthusiasm for exploring and thoughtfully assess a range of both pioneer and well-established techniques of locoregional anaesthesia and analgesia techniques in equine anaesthesia.

However, the benefits of locoregional anaesthesia and analgesia extend beyond horses undergoing surgery under standing sedation. These approaches also offer numerous advantages for horses undergoing surgical procedures under general anaesthesia, including pre-emptive analgesia, reduced general anaesthetic requirements resulting in decreased drug side effects, improved recovery quality and post-operative pain relief (Gaesser et al., 2020; Louro et al., 2020).

Traditional perineural blocks in equine veterinary medicine have historically been performed blindly guided by anatomical landmarks. While this method can be effective through direct nerve palpation, its practicality is limited to nerves located close to the skin's surface. Recent years have witnessed a surge in research in human and small animal anaesthesia due to the adoption of innovative approaches and technologies to locate nerves situated deeper to the skin, such as peripheral nerve stimulation and ultrasound-guided injections. These techniques have to potential to improve accuracy and precision, as well as reduce complications associated with regional anaesthesia and analgesia. The use of these objective methods for locoregional anaesthesia in equine patients has led to the development of various new techniques for targeting different nerves and desensitising various anatomical areas, allowing for standing surgery as well as reduced intraoperative pain during surgery performed under general anaesthesia. To assess the advantages and disadvantages of these objective methods in comparison to traditional blind locoregional anaesthetic techniques, and to determine their impact on equine anaesthesia, analgesia, and surgery, further research is necessary. Developing a thorough grasp of the effects of these objective methods of nerve location has the potential to greatly facilitate the incorporation of such techniques into the day-to-day procedures of equine veterinary surgeons. Consequently, this empowerment will equip clinicians to make informed choices when selecting the most appropriate locoregional approaches for their equine patients, ultimately resulting in better patient care standards and enhanced surgical results.

Various drugs are used to perform locoregional anaesthesia or analgesia in horses. Among these, local anaesthetics are the prevailing choice, although additional drug categories such as opioids and alpha-2 adrenoceptor agonists can also be administered to achieve analgesia via locoregional methods. Recent advancements in pharmacology have endeavoured to influence the pharmacokinetics of local anaesthetics, aiming to prolong the duration of action of the block. This has been pursued through techniques such as encapsulating local anaesthetics within liposome molecular structures or introducing additives to traditional local anaesthetics.

This presentation purposes to present existing literature, discussing the advantages and disadvantages of performing locoregional anaesthesia and analgesia in horses undergoing surgical procedures either under general anaesthesia or standing sedation. This analysis aims to stimulate discussion on the utility and potential future of locoregional anaesthesia for equine patients.

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***Luís Filipe Louro** graduated from Vasco da Gama University in Portugal. After several years working in first opinion and referral equine practice, Luís completed a 3-year residency programme in Veterinary Anaesthesia and Analgesia at the University of Liverpool. Subsequently, Luís joined Rossdales Equine Hospital and in the same year became a Diplomate of the European College of Anaesthesia and Analgesia. Currently, Luís works for CVS Referrals Division and Veterinary Anaesthesia Consultancy Services providing Equine Anaesthesia and Analgesia consultancy in various equine hospitals in the UK, Ireland and France. A keen clinical researcher, Luís' interests include foal anaesthesia, pain management and recovery quality in horses.*