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Targeted Pain Relief in Horses: Ultrasound-Guided Nerve Block Techniques

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Abstract

Ultrasound guided (UG) nerve block in equine is increasingly utilized for both diagnostic and therapeutic purposes. This approach offers enhanced accuracy in anesthetic placement compared to blind techniques, reducing complications by enabling real time identification and avoidance of vital structures during the procedure. Studies have shown that ultrasound-guided nerve blocks are accessible even for veterinarians with limited experience, provided they have a fundamental understanding of sonographic anatomy. Many procedures can be accurately performed in the field with standard equipment while maintaining sterility and appropriate animal restraint. This review systematically examines available literature on ultrasound-guided nerve block techniques in horses and donkeys, covering regions from the head (including retrobulbar, peribulbar, auriculopalpebral, maxillary, and inferior alveolar nerve blocks) through the cervical plexus, brachial plexus, median and ulnar blocks of the forelimb, and pudendal nerve blocks, to the distal hind limb with emphasis on tibial and common peroneal nerve blocks.

Keywords: Anesthesia, Donkey, Horse, Nerve block, Ultrasound-guided.

Introduction

Nerve block is an anesthesia technique in which an anesthetic drug is injected nearby targeted nerves to temporarily interrupt pain signals in a particular area of the body [1, 2]. This technique is widely used in veterinary medicine to provide effective, local analgesia without the need for general anesthesia, making it particularly useful in both standing surgeries and procedures where full sedation or general anesthesia may not be necessary or not applicable [1, 3]. In equine medicine, nerve blocks are frequently applied for diagnostics, such as identifying sources of lameness [4], as well as for therapeutic purposes [5], providing pain control during and after surgical interventions. By focusing on the affected region, nerve blocks minimize the animal's exposure to systemic medications, reduce recovery time, and allow for a more targeted, effective pain management approach [1, 3]. This descriptive data serves as a critical reference for anesthesiology researchers aiming to perform ultrasound-guided nerve blocks with greater precision [6]. Ultrasound-guided (UG) nerve blocks represent a significant advancement in veterinary anesthesiology, particularly in the precise and minimally invasive management of pain in large animals [7]. This technique utilizes ultrasound imaging to visualize nerve structures, enabling precise localization of the needle tip to the targeted area for anesthetic delivery [7, 8]. This approach not only enhances the effectiveness of the nerve block but also reduces the risk of complications associated with traditional blind techniques [8, 9]. The primary objective of this article is to review the current state of UG nerve block techniques in equines including both horses and donkeys, exploring their indications and techniques of application.

Material and Methods

Search Strategy

This review is based on an extensive literature survey using PubMed and Google Scholar databases. Keywords included "ultrasound-guided nerve block in equines," "ultrasound-guided nerve block in horses," "ultrasound-guided nerve block in donkey," "equine pain management," and "veterinary anesthesiology." Relevant studies were selected based on their contributions to understanding the application, effectiveness, and safety of UG nerve blocks in horses. The search was limited to the past

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15 years (2010–2025). Inclusion criteria encompassed original articles, case reports, and reviews on ultrasound-guided anesthesia in horses and donkeys. Studies unrelated to the research topic were excluded.

The nerve blocks are presented systematically from head to tail in horses and donkeys. Furthermore, the similarities in anatomy between these species suggest that nerve block techniques established in one species may be effectively applied to the other.

Results

UG Retrobulbar and peribulbar Nerve Block in Horses

The results of an experiments performed on horse cadavers showed that the use of an UG technique for dorsal retrobulbar nerve block is recommended to improve injection safety and reduce the risk of intraoperative globe-threatening complications [10-13].

Indications

A retrobulbar block, is indicated for enucleation, evisceration, and intraocular procedures, targets the ciliary ganglion, which lies approximately 1 cm from the posterior boundary of the orbit between the lateral surface of the optic nerve and the ophthalmic artery, as well as the ciliary nerves, and cranial nerves II, III, and VI within the muscle cone to achieve localized anesthesia. This technique spares cranial nerve IV, as it lies outside the muscle cone. In contrast, a peribulbar block, commonly used for orbital and anterior segment surgeries, involves placing the anesthetic outside the muscle cone, allowing diffusion throughout the orbit to anesthetize the orbital nerves, including cranial nerve IV, thereby providing a broader anesthetic effect [14, 15].

UG retrobulbar block technique

To achieve UG retrobulbar block, a high frequency (5-8 MHz) curved array ultrasound probe placed trans-palpebral on the closed upper eyelid. First, the optic nerve was visualized in both horizontal and vertical planes. A 21-gauge, 100-mm cannula was then inserted at the rostral end of the supraorbital fossa, directed caudomedially towards the posterior aspect of the zygomatic process, with a slight craniomedial angulation. Under US guidance, the needle was advanced with the aim of positioning its tip just posterior to the eyeball, in the craniocentral region of the cone formed by the retractor bulbi muscle. Where feasible, the needle tip was adjusted to allow simultaneous visualization of both the needle and the optic nerve within the same US image [10, 13].

UG peribulbar block technique

To perform an ultrasound-guided (UG) peribulbar block as described in horse cadavers [12], a 5 MHz micro-curved ultrasound (US) probe was positioned over the supraorbital fossa, perpendicular to the orbital rim. A 19-gauge, 3.5-inch spinal needle, primed with saline and attached to a 2.5 mL syringe containing saline, was inserted adjacent to the US probe within the supraorbital fossa. The insertion was performed in-plane, approximately 2 cm posterior to the probe, directed in a caudal-to-cranial orientation. The needle was advanced until its tip was positioned adjacent to, but outside of, the extraocular muscle cone. At this point, the local anesthetic was injected [12].

UG Retrobulbar Nerve Block in Donkey

Hagag and El Nahas described the UG retrobulbar nerve block in donkey cadavers [16]. Results showed that real-time visualization of needle, extraocular muscle cone and optic nerve enabled successful intraconal instillation of injectate. Gadallah et al. performed UG retrobulbar nerve block in live donkeys [17].

Indications

Enucleation, exenteration and intraocular surgeries.

Technique

Ultrasonographic scanning of the retrobulbar space was performed at a frequency of 8 MHz and a depth of 4-8 cm, targeting both the medial and lateral aspects of the head. The transducer was placed on the closed upper eyelid to obtain images. The optic nerve appeared in contact with the caudal end of the globe, presenting as a triangular echogenic structure surrounded by hyperechoic lines corresponding to the nerve sheath. The extraocular muscles and fat, located dorsally and ventrally to the optic nerve, were visualized as multiple hyperechoic and hypoechoic layers. A 21-gauge, 3.5-inch spinal needle was deemed appropriate for the injection of lidocaine solution into the retrobulbar space. Ultrasonographical, the needle was visible as a hyperechoic tubular structure directed toward the center of the conal space, with the injected lidocaine solution appearing as anechoic areas [17].

UG Auriculopalpebral Nerve Block in Donkey

Gadallah et al. performed UG auriculopalpebral nerve block in live donkeys. The report cited success of the technique evidenced by dropping of the ipsilateral ears and akinesia [17].

Indications

This block is primarily indicated for procedures involving eyelid surgeries, laceration repairs, and entropion correction. It is also used for ocular diagnostic procedures, including tonometry, and in cases of eyelid trauma requiring surgical intervention. Additionally, it is employed as part of a multi-block approach in more extensive eye surgeries, such as enucleation, to provide localized anesthesia of the eyelids and periocular muscles [18].

Technique

The auriculopalpebral nerve was identified ultrasonographically just caudal to the highest point of the zygomatic arch. It appeared as a leaf-like echogenic structure with a mottled center and a hyperechoic wall. The nerve was positioned caudal to the zygomatic bone and adjacent to the superficial temporal vein. Imaging was optimal at 10 MHz and a depth of 1-3 cm. A 24-gauge needle was used for lidocaine injections, visible as an anechoic area under real-time ultrasound. The skin-nerve depth was 4.096 ± 0.64 mm [17].

UG Maxillary Nerve Block in Horses and Donkeys

UG maxillary nerve blockade has been reported and concluded to be highly practical, enabling accurate maxillary nerve block while minimizing the risk of vascular penetration as reported in horses [19, 20], and donkey cadaverss [21].

Indications

This block is indicated for dental procedures, including tooth extractions and root canal treatments, as well as surgeries involving the maxilla, nasal passages, and sinuses. It is also used for pain management in cases of facial trauma, such as maxillary fractures, and during diagnostic procedures like biopsies of the maxillary tissues or sinuses. This block anesthetizes the maxillary nerve, which innervates the upper teeth, gums, palate, and portions of the nasal cavity [18].

Technique

The transducer was placed caudal to the facial crest, just below the lateral canthus, with the ultrasound beam directed rostroventrally towards the last maxillary cheek tooth on the opposite side. The scan was performed between the maxillary tuber and the junction of the frontal and palatine bones, from dorsal to ventral, to locate the maxillary and sphenopalatine foramina. An 18-gauge, 90-mm spinal needle was inserted 1 cm ventral to the transducer, following the long axis of the ultrasound beam (in-plane approach), targeting the junction of the maxillary and sphenopalatine foramina with the palatine bone. The needle was advanced under direct ultrasonographical vision through the skin, subcutaneous tissue, deep fascia, masseter muscle, and extra periorbital fat until the maxillary nerve and associated vascular structures were identified (O'Neill et al., 2014; Stauffer, Cordner et al., 2017; Hagag & Tawfiek, 2018).

UG Inferior Alveolar Nerve Block in Horses and Donkeys

This technique presents challenges and does not demonstrate greater accuracy than previously published blind techniques. Additionally, any extraoral approach to the inferior alveolar nerve (IAN) is likely to also result in desensitization of the lingual nerve [22]. Ali et al. performed UG inferior alveolar nerve block in live donkeys through caudal medial mandibular acoustic window [23].

Indications

This block is indicated for dental procedures involving the lower jaw, including tooth extractions, root canal treatments, and dental surgeries. It is also used for pain management in cases of mandibular fractures, oral lesions, or traumatic injuries to the lower teeth and gums. This block provides anesthesia to the inferior alveolar nerve, which innervates the lower teeth, gums, and parts of the mandible [18].

Technique in horses

This block is performed by identifying the mandibular foramen on the caudal third of the mandible (Angular technique). The transducer is rotated to detect a 3 mm bone dropout at a depth of 6–8 cm, corresponding to the foramen. A straight 18-G, 9-cm spinal needle is then advanced under ultrasound guidance to the foramen, where 2.5 to 5 mL of anesthetic solution is injected [22].

Technique in donkeys

The procedure was performed using an 8 MHz curved array transducer. The transducer was positioned on the caudomedial aspect of the mandible (caudal approach), and the area was scanned with the ultrasound beam directed forward and medially until the mandibular foramen was located. The distance from the skin to the target nerve was measured using ultrasound. A straight 18-gauge, 10 cm spinal needle was then advanced transcutaneous, craniomedially from the caudal edge of the mandible to the mandibular foramen, under direct visualization. Two milliliters of local anesthetic solution were injected on both sides of the mandible [23].

UG Cervical Plexus Block

Campoy et al. described the clinical application of the UG cervical plexus block in horses. The roots of C2 and C3 nerves were located between the longus capitis and the cleidomastoideus muscles, caudal to the parotid gland under visual guidance of ultrasound and local anesthetics injected. The UG cervical plexus block is reported to be a viable alternative to tissue infiltration for the unilateral laryngeal surgery [24].

Indications

The block of superficial branches of C1-C3 is indicated for surgeries involving the neck, upper chest, and head, including tumor removal, thyroid, and laryngeal procedures. It is also used for pain management in cervical spine trauma, diagnostic procedures like biopsies, and lameness examinations related to the neck or shoulder. This block provides anesthesia to the cervical nerve roots, affecting structures in the neck [24, 25].

Technique

A multifrequency linear-array ultrasound transducer (15-6 MHz) was placed 6 cm caudal to the wing of the atlas, parallel to the longissimus Atlantis tendon over the cleidomastoideus muscle. Then the C2 and its surrounding structures were identified on ultrasound. A 20-gauge, 9 cm Tuohy needle was advanced under ultrasound guidance craniomedially, into the fascial plane between the cleidomastoideus and longus capitis muscles, near the second cervical spinal nerve. One mL lidocaine was then administered [24].

UG Brachial Plexus Nerve Block in Donkeys

Ultrasound imaging has been employed to successfully identify the brachial plexus and associated blood vessels. Administration of 25 mL of lidocaine per injection site achieved effective sensory and motor blockade of the forelimb nerves following brachial plexus blockade, demonstrating the efficacy of this approach in donkeys [26].

Indications

The brachial plexus block in equines is indicated for forelimb surgeries, such as fracture repair and soft tissue procedures, as well as for pain management in brachial plexus injuries. It is also used in diagnostic imaging, biopsies, and lameness evaluations involving the shoulder, upper limb, or forelimb, providing anesthesia to the muscles and skin [27].

Technique

A high-frequency 5–10 MHz linear transducer was positioned in front of the cranial border of the scapula, at the first rib, and dorsal to the shoulder joint. Color Doppler mode was employed to assist in vessel identification. A 20-gauge, 90 mm spinal needle was inserted just ventral to the ultrasound transducer and positioned vertically to the located then 25 mL of local anesthetic was injected [26].

UG Median and Ulnar Nerve Block

Ultrasound guidance has facilitated real-time visualization of needle placement, catheter positioning, and anesthetic dispersion, contributing to a high success rate for nerve blocks. Horses undergoing median and ulnar nerve blocks displayed no discomfort or infection at catheter sites, though additional studies are needed to confirm the efficacy and safety of this approach [28, 29].

Indications

These blocks are indicated for surgeries involving the distal forelimb, such as digit amputations, fracture repairs, and soft tissue procedures. They also provide pain relief for conditions like tendon injuries, joint disorders, and wounds, and are commonly used in diagnostic nerve blocks to localize lameness in the distal forelimb. These blocks target the median and ulnar nerves, which innervate the fetlock, pastern, and hoof, facilitating diagnostic procedures and treatments in this region [27, 29].

Technique

Median nerve

<u>Caudal approach</u>: The probe is placed transversely on the medial aspect of the forearm over the flexor carpi radialis muscle, proximal to the chestnut. The median nerve is located near the median artery. A linear probe may need to be shifted cranially to properly position the needle. A 25 mm needle is inserted caudally alongside the probe, directed towards the caudal aspect of the median nerve. 4–6 mL of mepivacaine or lidocaine is injected into the connective tissue around the neurovascular bundle, avoiding direct contact with the nerve (Beaumont et al., 2021).

Cranial approach

The probe is positioned transversely at the same level but moved slightly caudally to create space between the probe and radius. A 25 mm needle is placed cranially to the probe, directed to the cranial aspect of the median nerve. Once the needle tip reaches the perineural connective tissue, 4–6 mL of anesthetic solution is injected, and the needle is advanced closer to the nerve to complete the injection (Beaumont et al., 2021).

Ulnar nerve

A multifrequency linear transducer (13–6 MHz) transducer was positioned transversely to the limb at the antebrachial region to identify the ulnar nerve and adjacent structures. A 22-gauge, 50 mm echogenic needle was inserted percutaneously at a 60-degree angle between the transducer and the limb, in a proximal to distal direction, then 5 mL of local anesthetic were injected over 2–3 minutes into the perineural sheath of the ulnar nerve (Souto et al., 2020**)**.

UG Pudendal Nerve Block in Donkeys

In donkeys, successful pudendal nerve blocks were achieved. The method proved to be feasible, accurate, and effective, providing satisfactory anesthesia of the anus, perineum, penis, prepuce, and glans penis while the animal remained in a steady standing position [30].

Indications

This block indicated for pain management in the perineal region, aiding in surgeries or procedures involving the vulva, anus, urethra, and penis, as well as during prolonged rectal examinations, obstetrical interventions, and management of perineal trauma [1].

Technique

The operator inserted his left hand and the rectal probe, with a 10-5 MHz transducer, into the rectum, positioning it ventrolateral. An ultrasound machine with color-coded Doppler was used to identify the internal pudendal blood vessels. Using his right hand, the operator introduced a 20-cm, 18-gauge needle at the dorsal aspect of the ischiorectal fossa. The needle shaft was visible on the ultrasound screen and was advanced slowly, under direct visualization, to a position just above the internal pudendal vessels, then 5 mL of local anesthetic injected (El-Sherif et al., 2017).

UG Tibial Nerve Block in Horses

The findings of a study compared the UG to the blind technique indicate that UG tibial perineural injection is more effective in achieving adequate and rapid tibial analgesia compared to the blind injection technique, though it requires a longer completion time [31-33].

Indications

This block is indicated for diagnosing and managing distal limb pain and lameness localized to the hock, pastern, fetlock, or foot. Continuous injection of local anesthetic at this site controls pain from injuries to tendons, ligaments, and bones, and facilitates minor surgical or diagnostic interventions [15].

Technique

In a transverse ultrasound section, approximately 8 to 10 cm proximal to the point of the hock, the tibial nerve appears as an oval, echogenic structure with a fascicular architecture of round fasciculi. It lies within a hypoechoic fat layer, caudal to the caudal root of the medial saphenous and caudal femoral veins, and cranial to the superficial digital flexor tendon at the calcanean tendon. The probe is placed cranially along the common calcanean tendon, leaving space for needle insertion. The needle is introduced into the ultrasound beam, advanced through the superficial caudal crural fascia to the caudal aspect of the tibial nerve, where 5-8 mL of the anesthetic solution is administered [32].

UG Tibial and Common Peroneal Nerve Block in Donkeys

A study performed on live donkeys concluded that ultrasound is a safe, cost-effective, and accurate tool for blocking the tibial and common peroneal nerves [7]. Furthermore blockade of these nerves provides adequate distal hind limb desensitization [34].

Indications

These blocks are indicated for diagnosing and managing distal limb pain, particularly in cases of lameness affecting the hock, pastern, fetlock, or foot. It provides effective analgesia for injuries to tendons, ligaments, joints, and bones, and facilitates minor surgical or diagnostic procedures in the distal limb [15].

Technique

For the tibial nerve block, a linear probe (14 MHz) was positioned in the transverse plane in the middle of the lateral thigh, just cranial to the Achilles tendon. A 24-gauge needle was inserted at the cranial or caudal pole of the probe and directed toward the nearest point of the nerve, then 5 mL of local anesthetic injected [34].

For the common peroneal nerve block, a linear probe (14 MHz) was positioned transversely at the proximal lateral thigh, just distal to the lateral collateral ligament of the femorotibial joint and caudal to the proximal aspect of the lateral digital extensor muscle. A 24-gauge needle was inserted subcutaneously at the cranial or caudal pole of the probe and directed toward the nearest point of the nerve, then 5 mL of local anesthetic injected [34].

Discussion

Twelve nerve blocks in horses and donkeys were reported. All reports were published in peer reviewed journals. The data on nerve blocks in equines, particularly in horses and donkeys, reveals broad applications across both cadaveric and clinical settings, with research spanning from 2013 to 2024. Retrobulbar and maxillary techniques are widely utilized, with retrobulbar blocks studied consistently in both species. Peribulbar blocks appear limited to cadaveric studies in horses only. Auriculopalpebral and pudendal blocks are uniquely documented in clinical applications for donkeys, suggesting species-specific approaches. The maxillary, inferior alveolar, and tibial-peroneal blocks demonstrate broader applicability, showing use in both clinical and cadaveric contexts for horses and occasional use in donkeys. Median and ulnar blocks are specific to horses, indicating a role in clinical practice. Cervical and brachial plexus blocks are infrequently applied, with each technique observed only in limited settings and specific to one species. Overall, the extensive documentation underscores an evolving interest in refining nerve block techniques across the years, particularly in species-specific contexts for both therapeutic and diagnostic applications. Research results are illustrated in table 1. The nerve blocks are shown in figure 1.

All studies except that conducted by Johnson et al. 2017, concluded the efficacy and accuracy of the ultrasound guided technique either directly applied or when compared to the blind technique [9] and recommended ultrasound guidance over blind approaches.

Ultrasound-guided (UG) nerve blocks of the head in horses and donkeys, including retrobulbar, peribulbar, auriculopalpebral, maxillary, and inferior alveolar blocks, have been described. Ultrasound-guided (UG) retrobulbar and peribulbar block techniques have been demonstrated in horse and donkey cadavers [11, 13, 16] and live donkeys [17], with both approaches shown to be clinically applicable. The retrobulbar block in donkeys has been reported to provide effective anesthesia clinically. In the retrobulbar block, the ultrasound probe is placed trans-palpebral to visualize the eyeball and optic nerve within the muscle cone. The anesthesia needle is then inserted percutaneously, out-of-plane, through the supraorbital fossa, and advanced distally and cranially to reach the space over the optic nerve. The peribulbar block, although equally effective, is considered safer than the retrobulbar block due to its technique of injecting anesthetic outside the muscle cone, allowing the anesthetic to diffuse to the target ganglia. For the peribulbar block in horses, a micro-curved ultrasound probe is positioned over the supraorbital fossa, and the anesthesia needle is advanced in-plane under direct ultrasound visualization, ensuring accurate needle placement and effective anesthetic delivery [12]. A description of the auriculopalpebral block in live donkeys was reported to be easily and effectively applied [17]. The ultrasound-guided (UG) maxillary block technique was described and compared to the blind approach in horse and donkey cadavers [20, 21], achieving a 100% success rate without vascular penetration, compared to a 69.2% success rate with the blind technique, which also posed a risk of neurovascular trauma [21]. The inferior alveolar nerve block is frequently applied block due to more common pathologies of the mandible and lower teeth in equine [35]. An extraoral ultrasound-guided vertical inferior alveolar nerve block technique, using a micro-curved array ultrasound probe with the needle inserted and advanced in-plane, was described in horse cadavers, and its accuracy and effectiveness were assessed via CT scanning [22]. In live donkeys, an extraoral caudal approach was described in which the micro-curved array probe was placed in the groove between the medial surface of the mandible and the neck, with the needle advanced in-plane cranially to the level of the mandibular foramen [23].

Ultrasound-guided (UG) nerve blocks of the neck and shoulder include the cervical plexus block, demonstrated in live horses, and the brachial plexus block, in live donkeys. The superficial cervical nerves (C2–C3) innervate peri laryngeal structures, making the cervical plexus block an effective alternative to local tissue infiltration for standing unilateral laryngeal surgery, enhancing surgical field conditions. This technique has proven adequate for procedures like prosthetic laryngoplasty [24]. The color flow doppler ultrasound-guided brachial plexus nerve block reported to be feasible and safe method for achieving adequate analgesia in the distal forelimb of donkeys, suggesting its potential use for forelimb surgeries [26].

Ultrasound-guided (UG) nerve blocks of the forelimb, including median and ulnar nerve blocks, have been described in live horses. This approach allows real-time visualization of the needle, catheter, and drug dispersion, resulting in a high success rate. Horses receiving median and ulnar nerve blocks showed no signs of discomfort or infection at the catheter insertion site [28]. The median nerve block can be performed via two approaches. In the caudal approach, a probe is placed transversely over the flexor carpi radialis muscle, and a 25 mm needle is directed caudally to the median nerve. In the cranial approach, the probe is shifted slightly caudally, and the needle is advanced towards the cranial aspect of the median nerve for a similar injection. The ulnar nerve block involves positioning a multifrequency linear transducer transversely at the antebrachium [28].

Ultrasound-guided (UG) nerve blocks of the hip and hindlimb, including the pudendal, tibial and common peroneal nerve blocks. Color flow doppler ultrasound-guided bilateral pudendal nerve blocks in male donkeys demonstrated a feasible, accurate technique for effectively locating the pudendal nerve, resulting in satisfactory anesthesia of the anus, perineum, penis, prepuce, and glans penis while the animal remained in a steady standing position [30]. In cadaveric study on horse limbs, distal diffusion of the injectate following perineural injection of the tibial nerve (TN) was significantly lower with ultrasound-guided (USG) techniques compared to blind methods. Similarly, proximal, distal, and medial diffusion of the injectate for femoral nerves (FNs) was reduced with USG compared to blind approaches [33]. Ultrasound guidance with low volumes achieves similar block success to blind techniques, allowing veterinarians flexibility in choosing their preferred method. Ultrasound guided injection of the tibial nerve in live horses increases block accuracy by preventing intravascular injections or misplacement beneath the deep caudal crural fascia, which can hinder anesthetic diffusion. By positioning the anesthetic closer to the nerve, the block's specificity improves, leading to faster anesthesia of the distal limb. Additionally, a smaller anesthetic volume (10–12 mL) is sufficient, reducing the risk of proximal diffusion [32] although reported to be take longer to complete [31]. In a live study with donkeys, ultrasound-guided nerve blocks enabled real-time imaging of anesthetic distribution around target nerves, reducing drug volume, promoting rapid onset, and extending analgesia duration. This technique minimizes risks associated with blind approaches, such as nerve trauma, hemorrhage, and mis injections. Additionally, tibial and common peroneal nerve blocks achieved complete desensitization of the distal hind limb, supporting their use in standing surgical procedures [34].

Conclusions

The current review highlights ongoing research and opens avenues for the clinical evaluation of techniques described in cadavers, specifically in live horses and donkeys. It also encourages further investigation into underexplored nerve blocks with clinical relevance in horses, donkeys, and other large animal species. Additionally, the study provides valuable insights into the essential tools for ultrasound-guided (UG) blocks and positioning techniques, offering a foundation for comparing various approaches. Researchers are also equipped with a background to compare traditional blind or anatomically guided nerve blocks with advanced colour flow Doppler-guided methods in equine medicine.

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Declaration of Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical of approval

This study follows the ethics guidelines of the College of Veterinary Medicine, King Faisal University, Saudi Arabia (ethics approval number; 49/2025).

TABLE 1. Summary of Ultrasound-Guided Nerve Blocks in Horses and Donkeys: Published Studies and DOI References.

Nerve block	Horses		Donkeys		Year published	DOI
	Cadaver	Clinical	Cadaver	Clinical		
Retrobulbar	✓✓	--	✓	✓	2013 2023 2022 2024	https://doi.org/10.1111/j.1467-2995.2012.00780.x https://doi.org/10.1111/vop.13053 https://doi.org/10.1016/j.vaa.2022.01.002 https://doi.org/10.21608/jcvr.2024.384905
Peribulbar	✓	--	--	--	2021	https://doi.org/10.4142/jvs.2021.22.e22
Auriculopalpebral	--	--	--	✓	2024	https://doi.org/10.21608/jcvr.2024.384905
Maxillary	✓✓	✓	✓	--	2014 2017 2018	https://doi.org/10.1111/evj.12106 https://doi.org/10.1016/j.vaa.2016.09.005 https://doi.org/10.1016/j.vaa.2017.06.006
Inferior alveolar	✓✓	✓	--	✓	2019 2022 2019	https://doi.org/10.1177/0898756419844836 https://doi.org/10.1111/eve.13720 https://doi.org/10.21608/djvs.2019.62118
Cervical plexus	--	✓	--	--	2018	https://doi.org/10.1111/evj.12956
Brachial plexus	--	--	✓	✓	2019	https://doi.org/10.26873/SVR-739-2019
Median and Ulnar	✓	✓✓	--	--	2020 2021	https://doi.org/10.1016/j.vaa.2019.12.008 https://doi.org/10.1111/eve.13287
Pudendal	--	--	--	✓	2017	https://doi.org/10.21608/avmj.2017.170961
Tibial, fibular and common peroneal	✓✓	✓✓	✓	✓	2023 2023 2018 2024 2024	https://doi.org/10.1016/j.jevs.2023.104299 https://dx.doi.org/10.2139/ssrn.4333198 https://doi.org/10.1111/eve.13020 https://doi.org/10.1111/eve.13855 https://doi.org/10.21608/jcvr.2024.384904

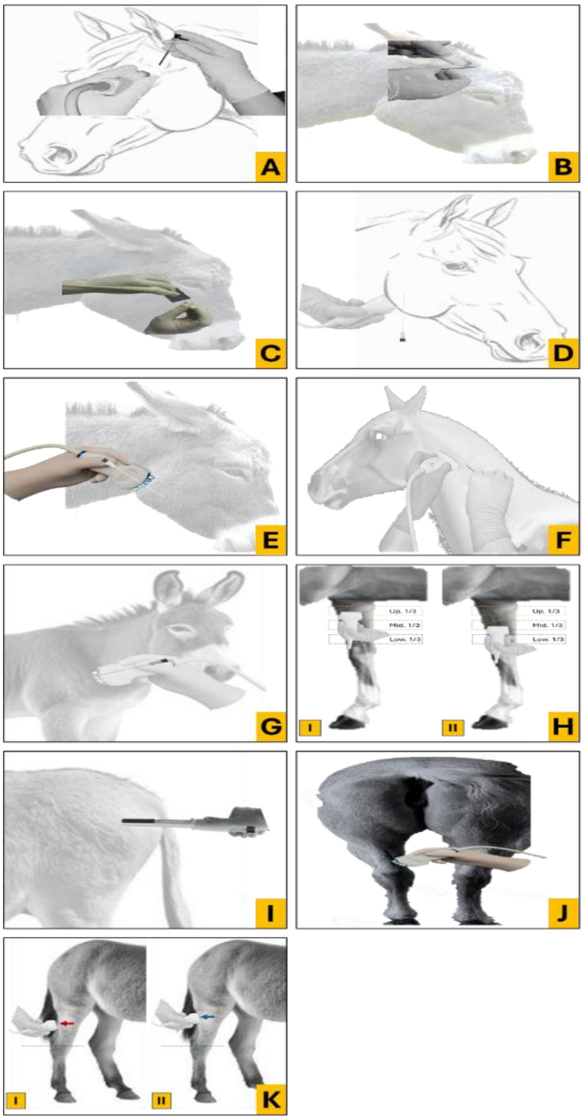

Fig.1. Applications of ultrasound-guided nerve blocks: (A) retrobulbar block in horses and donkeys, (B) auriculopalpebral block in donkeys, (C) maxillary block in donkeys, (D) inferior alveolar block in horses, (E) inferior alveolar block in donkeys, (F) cervical plexus block in horses, (G) brachial plexus block in horses, (H-I) radial block and (H-II) ulnar block in horses, (I) pudendal block in donkeys, (J) tibial block in horses, (K-I) tibial block and (K-II) deep peroneal block in donkeys.

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التخدير الموضعي الموجه بالموجات فوق الصوتية في الخيول

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الملخص

يُعد التخدير الموضعي بتوجيه الموجات فوق الصوتية من التقنيات المتطورة التي تزداد استخدامًا في مجال الطب البيطري، خاصة في الخيول، سواء لأغراض تشخيصية أو علاجية. تتميز هذه الطريقة بدقة عالية في تحديد مواقع الأعصاب المستهدفة وحقن المخدر الموضعي، مقارنة بالطرق التقليدية التي تعتمد على المعالم التشريحية فقط دون توجيه بصري. تعتمد فاعلية هذه التقنية على القدرة على تصوير الأعصاب والأنسجة المحيطة في الوقت الفعلي، مما يمكن الطبيب البيطري من تجنب الأوعية الدموية أو البنى الحيوية الأخرى أثناء الحقن، وبالتالي تقليل خطر المضاعفات مثل النزف أو تلف الأنسجة. كما أظهرت الدراسات أن الأطباء البيطريين، حتى ذوي الخبرة المحدودة، يمكنهم إتقان هذه الطريقة بشرط أن يكون لديهم فهم جيد للتشريح الإشعاعي والاستخدام الأساسي لأجهزة الموجات فوق الصوتية. يمكن تطبيق التخدير الموجه بالموجات فوق الصوتية في العيادات الميدانية باستخدام أجهزة محمولة، مع مراعاة شروط التعقيم والتحكم السليم في الحيوان. وتشمل التطبيقات الشائعة لهذه التقنية تخدير أعصاب الرأس مثل العصب خلف المقلة والعصب الفكي العلوي، بالإضافة إلى أعصاب الأطراف الأمامية والخلفية مثل العصب المتوسط والعصب الظنبوبي. كما تُستخدم في عمليات أكثر تعقيدًا مثل تخدير الضفيرة العضدية أو العصب الفرجي. يُقدم هذا المقال مراجعة منهجية لأحدث الدراسات والتقنيات في مجال التخدير الموضعي الموجه بالموجات فوق الصوتية في الخيول والحمير، مع التركيز على المناطق التشريحية المختلفة وطرق تطبيقها العملي. مما يجعل هذه التقنية خيارًا أمثل لتحقيق تخدير آمن وفعال، مع تقليل الآلام والمضاعفات المحتملة في الحيوانات الكبيرة.

الكلمات الدالة: الخيول، الحمير، التخدير، الموجات فوق الصوتية، الألم.