

Local anesthesia for the eye and foot

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Abstract

The benefits of using local anesthetic techniques for medical and surgical procedures in ruminants are many, including avoidance of general anesthetic risks and cost, rapid recovery and return to function, and preservation of animal welfare. Certain blocks, namely the Peterson Eye Block, require some practice to achieve the block's full potential, but are performed easily over time with practice. The Peterson Eye Block and the auriculopalpebral nerve block for ocular procedures and the Bier (regional intravenous anesthesia) Block and interdigital block for procedures of the foot are presented.

Key words: local anesthesia, analgesia, eye, foot, surgery

Résumé

L'utilisation de techniques d'anesthésie locale lors de procédures médicales ou chirurgicales chez les ruminants est avantageuse car elle évite les risques et le coût d'une anesthésie générale et permet le prompt rétablissement et retour en fonction de même que le maintien du bien-être animal. Certains blocs, comme le bloc Peterson pour les yeux, demandent un peu d'expérience pour réaliser son plein potentiel mais peuvent s'effectuer facilement avec de la pratique. On présente ici le bloc Peterson pour les yeux, le bloc pour le nerf auriculo-palpébral durant les procédures oculaires, le bloc Bier (anesthésie intraveineuse régionale) et le bloc interdigital pour les procédures du pied.

Introduction

Provision of anesthesia and analgesia should always be considered where surgical intervention is planned. Both anesthesia at the time of a procedure and follow up analgesia should be planned, and here the focus will be procedural anesthesia. Procedural anesthesia prevents a ramp-up of pain, which makes pain control less complete postoperatively. Further, procedural anesthesia improves animal behavior during the procedure and provides the surgeon with an improved operating situation. Procedures are performed more rapidly, with less tissue trauma, and animals return more rapidly to expected function.

Lidocaine (2%) is the preferred local anesthetic by practitioners. It has a time of onset of 5 to 10 minutes and a duration of approximately 1 hour. In cattle, a toxic dose of 4.5 mg/lb (10 mg/kg) is observed, but is rarely approached in

most situations. Other compounds, such as bupivacaine and mepivacaine, provide increased duration of activity and are less irritating. In this manuscript, all blocks will be described using 2% lidocaine.

Peterson Eye Block

The Peterson Eye Block was developed to avoid the risk of inadvertent injection into the optic nerve sheath that accompanies the retrobulbar or 4-point block. It provides blockade of the oculomotor (III), trochlear (IV), abducens nn. (VI), and all 3 branches of the trigeminal nerve (n.) (V). It immobilizes the globe and provides anesthesia of the eye and orbit, but does not paralyze the upper eyelid. It is therefore often performed along with the auriculopalpebral n. block, which prevents blinking during procedures.

The area caudal to the eye is clipped along the zygomatic arch to the cranial edge of the ear. After aseptic preparation, a 14 ga, 1" (2.5 cm) pilot needle is placed perpendicular to the skin into the notch formed by the supraorbital process and zygomatic arch. As the bone is approached, 5 mL of 2% lidocaine is placed in the subcutaneous tissue and the needle is advanced to the hub and withdrawn. An 18 ga, 4 to 5" (10 to 12.7 cm) is placed through the pilot hole in the skin and advanced, perpendicular to the skin. Spinal needles or stainless steel needles may both be used. Some will place a slight

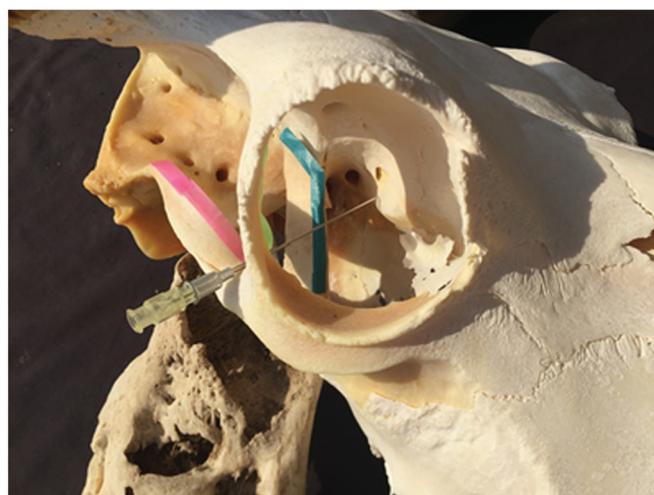


Figure 1. Needle placement for the Peterson Eye Block. The needle is advanced through the bony notch created by the supraorbital process (green) and zygomatic arch (pink), around the coronoid process of the mandible (blue) to the foramen orbitorotundum.

curve to this needle, such that the tip courses caudally. As the needle is advanced, the coronoid process of the mandible will be encountered. The needle should be gently walked off the cranial border of the coronoid process and advanced in a slightly ventromedial direction. The bony plate containing the target foramen orbitorotundum will then be encountered. Once the bone is encountered, the needle should be slightly withdrawn. After aspiration for blood, 10 to 15 mL of 2% lidocaine is infused into the area. The needle is withdrawn and an auriculopalpebral n block is performed if paralysis of the upper eyelid is desired. This can be performed on the way out using the same needle.

Auriculopalpebral Nerve Block

Blockade of the auriculopalpebral n. provides temporary paralysis of the upper eyelid, which allows for medical or surgical therapy of the eye uninterrupted by blinking. It is a branch of the facial nerve and does not have sensory activity. For painful procedures, it should be used in conjunction with other blocks which provide anesthesia of the eye and adnexa such as the Peterson Nerve Block or the 4-point block.

The nerve runs parallel to the zygomatic arch and ventral to the lateral ridge of the frontal bone. The site of injection is about midway between the lateral canthus of the eye and the base of the ear, just dorsal to the dorsal border of the zygomatic arch. An 18 ga, 1.5" (4 cm) needle is inserted into the skin and 5 to 10 mL of 2% lidocaine is infused into the area. It can be useful to move the tip of the needle around the region slightly to ensure full dispersal over the nerve.

Bier Block (Regional Intravenous Anesthesia)

Regional intravenous anesthesia is a technique in which a tourniquet is placed on the limb and local anesthesia is



Figure 2. Point of infiltration for lidocaine for blockade of the auriculopalpebral n. (orange x), dorsal to the zygomatic arch and ventral to the lateral ridge of the frontal bone.

infused into a superficial vein distal to the tourniquet. This provides total anesthesia to all tissues distal to the tourniquet for the duration of the tourniquet placement. Target tourniquet time is 30 minutes, no longer than 45 minutes. The vein most commonly used is the dorsal common digital vein (DCDV). Alternatively, any visible vein on the limb may be used, including the abaxial sesamoid vein. This procedure is most safely performed with the patient restrained in a foot trimming chute. It may also be performed in animals casted down, but heavy sedation is indicated as the tourniquet is a noxious stimulus that can result in kicking.

First, the dorsum of the foot is clipped. For foot conditions, the tourniquet is typically placed mid-metatarsus or mid-metacarpus. There are techniques for performing the procedure higher on the limb for more proximal disease. The tourniquet can be easily created from inner tubing, cut to a size of 2" by 40" (5 cm by 100 cm). It is repeatedly wrapped around the limb and finished with a quick release tuck. The site of injection, dorsal midline of the foot, just below the level of the fetlock, is then aseptically prepared. Using a 19 ga butterfly catheter, the DCDV is catheterized by inserting the needle exactly on midline at a 30 to 40° angle. Once the vein is entered, there will be an immediate flash of blood which will rapidly fill the extension tubing. If the blood in the tube is not moving, alterations in the catheter position should be made until it is flowing freely. Then, 15 to 30 mL of 2% lidocaine



Figure 3. Proper placement of the butterfly catheter for regional intravenous anesthesia, demonstrating adequate retrograde bloodflow to confirm proper placement.

is injected, depending on the size of the animal. Adult cows generally receive 20 to 25 mL.

The catheter is removed at the end of this injection and pressure applied to the site using gauze and tape. The tourniquet is left in place while procedures including claw amputation, paring of a sole abscess, corn removal, or other painful procedures are completed. At the end of the primary procedure, the tourniquet is removed. This lidocaine will then enter the systemic circulation. Some practitioners advocate for a staged release of the tourniquet to prevent this bolus effect. However, intravenous lidocaine boluses of double this volume are regularly used in large animal medicine for various reasons without adverse effect.

Interdigital Block

For feet that are significantly swollen or the DCDV or other superficial vein is not accessible, an interdigital block may be performed. This exploits the bifurcation site of the nerve bundles as they branch to supply each digit to provide anesthesia to the whole foot. It is not considered to be the complete blockade that is provided by the Bier Block.



The dorsal and palmar/plantar aspects of the foot are clipped and prepared for injection. An 18 ga, 2 to 3" (5 to 7.5 cm) needle, depending on the size of the foot, is inserted into the dorsum of the foot, perpendicular to the skin, approximately 0.75 to 1" (2 to 2.5 cm) above the level of the coronary band. The needle is inserted until it reaches at least the mid-way point of the depth of the foot, dorsal to plantar/palmar, usually to the hub. Approximately 15 mL of 2% lidocaine is infiltrated into the tissue, with the injection continuing as the needle is withdrawn. The technique is repeated on the palmar/plantar aspect of the foot.

Suggested Readings

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Figures 4 and 5. Dorsal and palmar/plantar locations for local anesthetic perfusion for the interdigital nerve block of the foot.