Acute Pain Management: Local and Regional Anesthesia
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- Local and regional anesthesia are common practices in large animal veterinary medicine. In the past, locoregional techniques have been underutilized in small; however, recently there has been a surge in their use with small animal practice.
- Most common locoregional anesthetic techniques used for large animal surgery can also be adapted to small animals.
- A good understanding of basic anatomy, pharmacology of local anesthetic drugs, and patient physiology is essential in order to safely, and effectively, utilize local and regional anesthetic techniques.
- Combining local and regional anesthetic techniques with parenteral analgesics can provide small animal practitioners more flexibility and better options for pre-, intra- and post-operative pain management.

Physiology of and concepts regarding pain
- Acute pain is considered a normal, healthy, and protective physiological response to noxious stimuli. Chronic, centralized pain is considered a pathological, abnormal expression of pain.
- The dose of general anesthetics needed to abolish the effects of nociception is close to that which can abolish autonomic responses. High doses of general anesthetic drugs significantly depress the cardiovascular, respiratory, and thermoregulatory systems in the body. Analgesic modalities before, and during, surgery help decrease the dose of general anesthetics needed to provide immobility without loss of autonomic tone.
- Transduction: Mechanical, chemical, or thermal injury is converted to an electrical impulse by Aβ (quick pain) and C nociceptors (slow pain).
- Transmission: The noxious electrical impulse is transmitted from the periphery to the spinal cord via Aβ and C sensory neurons. The synapse between the sensory neurons and the spinal cord occurs at lamina II (substantia gelatinosa) in the dorsal spinal horn.
- Primary (spinal) modulation: Within the spinal cord the afferent, noxious sensory impulse undergoes initial analysis. The spinal cord upgrades or downgrades the severity of the noxious stimulus and communicates that information to the brain. An unconscious reflex arc is the result of primary (spinal) modulation.
- Projection: After primary modulation, the noxious information is then projected to the brain via several tracts: two examples are the spinocervicothalamic (fast pain) and spinoreticular (slow pain) tracts.
- Secondary (cerebral) modulation: Within the conscious brain noxious afferent input is perceived as pain. Unconsciousness (anesthesia) blunts, or abolishes, secondary nociceptive modulation.
- Animals and humans share similar anatomical and physiological nociceptive structures for the production, conduction, and modulation of pain.
- Pain assessment in animals is based on anthropomorphic comparisons, subjective, and objective criteria.
- Pain is the conscious perception of nociception. Nociception is the physiological processes that involves the conversion of a noxious stimulus to an electro-chemical impulse and modulation in the CNS.
- The perception of pain does not occur during general anesthesia; however, without analgesic modalities the process of nociception still occurs, which can lead to centralized, or wind-up pain.
- Providing analgesics before surgery is called pre-emptive analgesia. Studies have shown that preemptive analgesia significantly decreases the likelihood of hypersensitivity associated with surgical pain.
- Preventive analgesia is a term that describes a comprehensive pain control plan that includes pre-, intra- and postoperative therapies. Preventive analgesia has been well established in human medicine but not yet in veterinary medicine.

Local and regional anesthetic techniques in small animal practice
- Lidocaine and bupivacaine are the most common local anesthetics used in small animal practice.
- Local anesthetics are fast-sodium channel blocking agents. In their bottles local anesthetics are acidic and inactive. When injected into the body (comparatively alkaline), the local anesthetic molecules dissolve into HCl salts and active bases. The active bases diffuses across the nerve epineurium and cell membrane into the cytoplasm and block sodium channels.
Toxic effects of local anesthetic depend on the drug. Lidocaine causes dose-dependent neuro- and cardio-toxic effects. Bupivacaine has potent cardio-toxic effects. Inadvertent intravenous injection of local anesthetics must be avoided; therefore, always aspirate before injecting.

Most locoregional anesthetic techniques can be performed blindly; however, a peripheral nerve locating device (nerve stimulator) can help increase the success and safety of the procedures.

Quincke needles are designed specifically for locoregional techniques. Quincke needle bevels are blunter which allows for a better feel as the needle dissects through tissue planes.

Common regional techniques for dental procedures include mental, infra-orbital, maxillary, and mandibular nerve blocks. Auriculopalpebral and the greater auricular nerve blocks can be useful for procedures involving the ear such as, ear flushes and surgery.

The brachial plexus infiltration block can be used for surgeries involving the distal forelimb. A carpal ring block can be used for surgeries involving the forepaw such as declaws and digit amputations.

Lumbosacral epidural regional techniques are very useful for surgeries involving the hips and distal rear legs. The most common drugs used for lumbosacral epidurals is the combination of preservative free (PF) morphine and PF bupivacaine. Feline lumbosacral epidurals using PF morphine and PF bupivacaine can be done also; however, it is important to remember the feline spinal cord ends at S1 compared with the canine spinal cord, which ends at L5-6.

Caudal epidural techniques can be used to provide regional anesthesia during perineal surgeries and facilitate urethral relaxation for catheter placement in blocked male cats.

Infiltration catheters (soaker catheters) have manufactured fenestrations at their distal ends so that, when buried in the surgical wound, local anesthetics can be injected into the tissues providing a field of anesthesia.

References