

The following pain management protocol is tiered to ensure a global relevance, recognizing that not all analgesic modalities are available to veterinary practitioners and vary from region to region around the world. Its implementation will be guided by the various analgesic modalities available along with the needs of the individual patient requiring treatment. This protocol is reproduced from the WSAVA Global Pain Treatise, a succinct yet comprehensive review of pain assessment, various pain modalities, and the treatment of various clinically painful scenarios in both dogs and cats. The WSAVA GPC Pain Treatise published in the *Journal of Small Animal Practice* and is available for open access at the GPC pages of www.wsava.org.

Neuropathic pain

Neuropathic pain requires several classes of medications and procedures as it cannot be adequately managed with a single pharmacological or non-pharmacological therapy. Prior to, and during any surgical procedure, various different analgesic drugs and modalities can be used to reduce the inciting nociceptive afferent impulse. Many of these are continued postoperatively to reduce both peripheral (PNS) and central (CNS) sensitization.

NSAIDs

There is evidence to support an inflammatory response driving the pathophysiological changes of the peripheral and central nervous systems resulting in neuropathic pain and augmentation of pain processing by spinal prostanoids. While no studies are reported at this time, human clinical trials are currently underway investigating various modalities to target specific components of the neuroinflammatory process. It is advised that NSAIDs be used in the treatment of neuropathic pain.

Opioids

Opioids may be included in a multimodal regimen to manage neuropathic pain, but not as a stand alone analgesic. Opioids may have reduced effectiveness, where tactile allodynia (A-beta stimulus) is a component of neuropathic pain and where opioid receptors in the descending inhibitory pathway are reduced or inactivated, which may occur in neuropathic pain. Also, the closer the nervous system lesion is to the CNS, the less effective opioids may be; peripheral nerve injuries tend to respond better to opioid therapy than nerve root injuries, which respond better than spinal cord injuries. The shorter half-life of fentanyl is an advantage in patients with acute CNS or PNS pain/injury as withdrawal for assessment is more easily planned. Opioids with less propensity to cause emesis (e.g., fentanyl, methadone, butorphanol) should be titrated cautiously in any trauma patient to avoid potential vomiting and writhing, which will cause a marked and sudden increase in intracranial pressure in patients with known, suspected or occult brain injury. The naloxone titration technique to reverse side effects of opioids is recommended (see Table 1 of the full Guidelines). Buprenorphine OTM may be suitable for continuing home management for cats and small dogs.

NMDA antagonists

Low-dose ketamine is frequently used pre-, intra, and postoperatively to prevent and treat neuropathic pain. Following the administration of an opioid and an NSAID (when not contraindicated), an IV loading dose >0.5–4 mg/kg (to effect) of ketamine is administered, followed by a CRI 0.2–2+ mg/kg/h. Amantadine (3–5 mg/kg once daily orally) may be continued after ketamine is discontinued for longer-term therapy at home.

Local anaesthetics

Lidocaine systemically administered has been shown to be effective in the treatment of several neuropathic pain disorders. Lidocaine infusions should not be used in cats. Lidocaine 5% dermal patches may be of benefit where pain originates. Pharmacokinetic studies of the lidocaine patch in dogs are reported; however, no analgesic efficacy studies have been reported in dogs or cats for IV infusions or transdermal patches for neuropathic or chronic pain.

Anti-epileptics

Studies in humans and laboratory animals indicate that perioperative administration of gabapentin to animals with nerve injury may reduce the potential establishment of, or ongoing, neuropathic pain. Based on blood concentrations in dogs, dose at 10 mg/kg PO q8h (5 mg/kg PO q12h in cats), increasing as needed to effect (dose range 10–15 mg/kg in dogs). The dose limiting side effect is sedation. Some animals need several weeks to months for resolution of pain, or longer. A benefit of long term administration of gabapentin following trauma was reported in three cats; however, to date there are no prospective veterinary studies investigating the long-term effects of multimodal analgesia including gabapentin.

Alpha₂ adrenoceptor agonists

Medetomidine and dexmedetomidine may be added to a multimodal regimen. As an example, dexmedetomidine (1–2 µg/kg/h), in addition to low-dose fentanyl (4–3 µg/kg/h) and corticosteroids, can be effective for management of the severe pain associated with meningitis in the dog. Intra- and postoperative pain management for intervertebral disc herniation is another example. No observed adverse effects are noted at this low dose other than potential for increased urinary output.

Acupuncture and medical massage

These should be included in the analgesic regimen as soon as possible. Neuropathic pain is difficult to manage with pharmaceutical agents alone, therefore the use of acupuncture and other integrative techniques should be included as adjuncts to a multimodal pharmaceutical regimen.

Serotonin and norepinephrine re-uptake inhibitors

These (e.g., amitriptyline, dogs: 1–2 mg/kg orally q12–24h; cats: 2.5–12.5 mg/cat orally q24h, gabapentin [see above]) may be beneficial as a home medication in combination with those listed above, as the descending inhibitory system appears to be dysfunctional in neuropathic states.

For additional pharmaceutical dosing information, see the dosing tables in the WSAVA GPC Treatise at www.wsava.org