PAIN MANAGEMENT FOR DENTAL PATIENTS **DENTISTRY**

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Pain is now considered by many clinicians and researchers as the 4th vital sign in veterinary medicine.
The perception of pain is called nociception. Nociceptors are specialized nerve endings that transmit impulses. The pain pathways are transduction, transmission, modulation, and perception. Transduction converts the stimulus to electrical energy; this step is inhibited by NSAIDs, opioids, and locals. Transmission is the propagation of the stimulus through the peripheral nervous system. The fibers perceive pain and categorize it as sharp or dull. Transmission may be reduced by locals and alpha-2-agonists. Modulation is when the neurons synapse and amplify the pain signals. Opioids can reduce this response, along with locals, alpha-2-agonists, and NSAIDs. Perception is the response to the signals. In the cerebral cortex, the mu and delta receptors are responsible for analgesia and euphoria, which will decrease the heart rate and respiratory rate. The kappa receptors are responsible for dysphoria, constricted pupils, and sedation. Sigma receptors cause hallucinations. Perception may be inhibited by opioids, alpha-2-agonists, and general anesthesia.

Pain is a feeling and response to pain is unique to the individual. It may be difficult to recognize pain in our companion animals, which is where pain score charts may be useful. Glasgow Composite Pain Scale, Colorado State Canine and Feline Pain Scale Charts, and the AAHA/AAFP Pain Management Guidelines for Dogs and Cats should be utilized when evaluating patients for pain.

Untreated pain responses include prolonged hospital stay, increased risk of secondary complications, increased surge of catecholamines, leading to risks for arrhythmias, vasoconstriction, and hypotension. Patients may also demonstrate lowered gastrointestinal motility, leading to nausea and anorexia. Increased levels of circulating cortisol may lead to immunosuppression and an increased risk of infection. Long-term pain syndromes may be present, such as phantom pain or neuropathy.

Pre-emptive analgesia and multi-modal anesthesia are ways to ensure that the patient has a relatively “painless” procedure, with easy induction and recovery. By decreasing the amount of induction drugs needed, as well as the reduction in the amount of gas anesthesia used, we can significantly lower the possibility of negative side effects due to anesthesia.

Opioids decrease the release of neurotransmitters and inhibit signal transmission, providing good analgesia and sedation. Side effects include bradycardia, mild respiratory depression, nausea, and histamine release. There are two types of opioids: pure agonists, such as morphine, fentanyl, and hydromorphone, and partial agonists, such as butorphanol and buprenorphine. There is sustained or extended release buprenorphine, which may last up to 24 hours. Opioids may be reversed by giving naloxone. Butorphanol partially reverses the mu agonists.
Alpha-2-agonists decrease the release of neurotransmitters by stimulating the central nervous system’s alpha-2-receptors. Examples are xylazine and dexmedetomidine. They provide good analgesia, mild muscle relaxation, and good sedation. Often combined with opioids. Use post-operatively to treat dysphoria. May cause bradycardia, vasoconstriction, and vomiting. The effects may be reversed by giving any of the following: yohimbine, tolazine, or atipamazole.

NMDA antagonists such as ketamine aren’t used commonly as an analgesic, but more for sedation. CRIs, such as lidocaine or ketamine, can help provide analgesia during the procedure, reducing the amount of gas anesthesia required.

Local analgesics inhibit the generation and conduction of the nerve impulses by blockage of sodium channels in the nerve membrane. They are metabolized by the liver and typically are fast acting. Examples are lidocaine, bupivacaine, and mepivacaine. We can perform local nerve blocks for dental surgeries, allowing us to use less gas anesthesia and provide a smoother recovery and better pain control. Nerve blocks utilized in dentistry and oral surgery are the infraorbital, maxillary, palatine, middle mental and inferior alveolar, or mandibular blocks. When done properly, there is good pain control and few negative side effects. Another option is to add buprenorphine to the nerve block to provide longer analgesia. It is possible to reverse these effects with OraVerse™.

Post-operative pain control may be necessary, such as another administration of buprenorphine or placement of a fentanyl patch. Fentanyl patches are effective in cats at 4–12 hours. If there is an overdose, with the patient exhibiting symptoms such as panting, dilated pupils, and fever, removal of the patch is indicated. In dogs, the patch is effective at 12–24 hours. The patch is usually left on for 3–5 days and should be disposed of as medical waste. The FDA has approved Recuvyra® Transdermal Solution, a fentanyl solution applied topically via a syringe, to control postoperative pain in dogs. There are also buprenorphine and lidocaine transdermal patches. No studies have been performed to see if they are effective for dogs and cats.

Cats and small dogs respond well to oral administration of buprenorphine, given every 8 hours, as needed. NSAIDs or non-steroidal anti-inflammatory drugs are available either in pill or liquid form for post-operative pain relief or as an injection. Examples are carprofen, deracoxib, and meloxicam. Carprofen and meloxicam are available as a post-op injection, with an onset of action being 45–60 minutes. Derramax© has received FDA approval for control of post-operative pain and inflammation associated with dental surgery in dogs. NSAIDs are not nephrotoxic to normal kidneys. Their use is contraindicated in patients with decreased platelet function, patients on steroids, and patients with hepatic disease. Always give with food.

Tramadol is a synthetic opiate mu-receptor agonist. It acts like an alpha-2-agonist by binding to the mu receptors in the brain. Tramadol is a controlled drug, so log carefully. The tablet is very bitter, so advise clients not to crush it in food. It is often given with NSAIDs to increase the efficacy. Don't give to patients with Cushing's disease or those on tricyclic antidepressants. There is also a human version, that should be avoided, called Ultracet® that is a combination of tramadol and acetaminophen. Off label use in cats, but seems to be very effective for chronic pain. For animals with chronic pain, there are several choices: gabapentin, piroxicam, or tramadol. Codeine or hydrocodone has been found to be very effective at treating severe pain in dogs.

Alternatives to drug therapy are cold, heat, and massage therapy. Laser therapy and acupuncture may have some benefit post-operatively. Holistic remedies should only be considered when monitored by a veterinarian. Always check drug dosages in a formulary, such as *Plumb's Veterinary Drug Handbook*.

References

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