

A MULTIMODAL APPROACH TO FELINE PAIN MANAGEMENT

Carolina Medina, DVM, CVA, CVCH, DACVSMR

Patrice M. Mich, DVM, MS, DABVP, DACVAA, DACVSMR

PAIN MANAGEMENT

Pain Assessment

It is apparent that the primary, if not only, reason to assess pain is to take action to relieve pain. However, one of the most challenging responsibilities of veterinary professionals is pain assessment. Our patients are non-verbal, therefore pain assessment must be performed by surrogates or proxy (family members and medical professionals). Surrogate assessment is fraught with challenges: observer subjectivity, inter-observer variability, observer preconceived perception and assumption, lack of standardized intervention points, among others.

When determining whether to take action on treatment, process the data gathered in the methodical assessment. Make a list of differentials for the observed behaviors and responses. Are they caused by pain, anxiety, fear, hunger, medication effect, environment effect, etc.? If pain is the source of behavior change assign a pain score; treat appropriately and reassess, and then treat as needed and reassess, and so on until your patient is discharged from your care. Use of “as needed” pain therapy is common; if you write these orders then methodical reassessment is the only way to determine if it is needed.

Lean Body Condition

Obesity leads to an increased risk of multiple health issues including orthopedic disease and pain.^{1,2} Maintaining an optimum body condition is an essential factor for pain management in cats. Bjornvad et al.³ compared results of body condition scoring by use of a 9-point scale with body composition determined by dual-energy x-ray absorptiometry in neutered indoor-only domestic shorthair cats. Their results indicated that the 9-point scale is useful in determining a cat's percent body fat and therefore is clinically relevant. A body condition score and current weight should be assessed at every office visit to determine if a weight loss program needs to be instituted and if the current program is effective.⁴

Pharmacological Analgesics

Opioids are the most effective drug class for managing acute pain and can play a role in managing chronic pain.⁵ Full μ agonists elicit greater and more predictable analgesia than partial μ agonists or κ agonists. In a comparison study, buprenorphine administered before surgery and during wound closure provided adequate analgesia for 6 hours following ovariohysterectomy in cats, whereas butorphanol did not.⁶ In cats, IM and IV administration of opioids are recommended both pre- and post-operatively.⁷ Transmucosal or buccal administration of buprenorphine also has clinical efficacy.^{8,9} Non-steroidal anti-inflammatory drugs are the hallmark for the treatment of chronic pain and perioperative pain management. A retrospective study found that long-term use of meloxicam did not reduce the lifespan of cats > 7 years of age with pre-existing, stable chronic kidney disease compared to cats without chronic kidney disease.¹⁰ Low-dose meloxicam (0.01–0.03 mg/kg PO q 24 hr) is effective in treating arthritic cats and is well-tolerated even in cats with chronic kidney disease as long as their condition is stable.¹¹ Oral administration and long-term use of meloxicam in cats is off label use in the US. Robenacoxib is a COX-2 selective NSAID approved for surgical pain in cats. A long-term safety study was done in young cats giving 5 times the recommended dosage of Robenacoxib for 6 months and 10 times the recommended dosage for 6 weeks, which revealed minimal side effects.^{12,13} Local analgesics provide complete analgesia and should be used with every surgical procedure, if possible. Studies using both thermal threshold and surgical models demonstrated that Tramadol produces a pain-modifying effect in cats via the production of the μ -agonist M1 metabolite.^{14,15} Gabapentin is an anticonvulsant that produces analgesia by down-regulating calcium channels.¹⁶

Acupuncture

Acupuncture stimulates the release of endogenous substances such as beta-endorphins,^{17–19} dynorphins, enkephalins, and serotonin.^{20,21} Acupuncture is routinely used either as a single modality or more commonly as part of a multimodal approach to pain management. Painful feline conditions that respond favorably to acupuncture include degenerative joint disease/osteoarthritis, degenerative lumbosacral stenosis, cystitis, stomatitis, aortic thromboembolism, and neuropathia. Typical treatments are composed of about 5–20 needles that are left in place for 15–30 minutes, and are frequently connected to an electrical acupuncture unit for increased stimulation.

Transcutaneous Electrical Nerve Stimulation

Similar to acupuncture, transcutaneous electrical nerve stimulation (TENS) stimulates release of endogenous endorphins and therefore is used for analgesia. Small areas of hair must be shaved in order for electrical pads to be attached to the cat's skin to transduce the electrical current and treatments last approximately 15–20 minutes. This electrical current stimulates the sensory nerves and inhibits pain.^{22–24} TENS can be effective in some cats but is more cumbersome to deliver versus acupuncture.

Low-Level Laser Therapy

The mechanisms by which low-level laser therapy (LLLT) decreases pain includes release of endogenous opioids, changes in conduction latencies of nerves, increase of cellular metabolism, increase in circulation, promotion of neovascularization, decrease in fibrosis formation, and reduction of inflammation.^{22,25–28} In some studies, LLLT also improves wound healing via increasing cellular proliferation, re-epithelialization, and collagen deposition.^{22,25–28} Feline conditions that respond well to LLLT include osteoarthritis, degenerative lumbosacral stenosis, fractures, chronic wounds, and stomatitis. Most cats tolerate the treatment well as it is not in itself painful and requires a relatively short time to deliver the treatment.

Therapeutic Ultrasound

Therapeutic ultrasound utilizes sound waves to stimulate fibroblast activity, improve blood flow, increase protein synthesis, increase tissue extensibility, decrease pain, and aid in soft tissue and bone healing.^{22,24,29} Cats with muscle spasms, tendinitis, tendinopathies, soft tissue contracture, and non-healing fractures can be treated with therapeutic ultrasound. The hair over the treatment area must be shaved and coupling medium must be applied to transduce the sound waves. Most cats tolerate this therapy well, especially if a thermal setting is used, as it is soothing to the tissues.

Extracorporeal Shockwave Therapy

Extracorporeal shockwave therapy (ESWT) is a high energy, focused pressure wave that delivers energy to a specific focal point in the body. The pressure from this energy causes cells to release proteins, cytokines, and growth factors. ESWT can decrease pain through the release of serotonin in the dorsal horn and descending inhibition of pain signals.²² In cats, ESWT is most commonly used to treat osteoarthritis, tendinopathies, non-healing fractures, and chronic non-healing wounds. One drawback of this therapy is that cats must be sedated for this treatment as the machine produces a loud sound and the pressure of the sound waves is uncomfortable during treatment delivery. However, the treatment itself is relatively short (3–5 minutes) and is performed only 1–3 times or as needed.

Thermotherapy

Thermotherapy can be used for acute and chronic pain.^{30,31} Cold therapy causes vasoconstriction thus limiting the amount of blood flow to an area. It also decreases prostaglandins (inflammatory mediators) and nerve conduction velocity therefore it diminishes pain and inflammation. When ice is combined with compression, significant decreases in swelling can be seen.³⁰ Icing is usually recommended during the acute inflammatory phase of healing (first 3–5 days). This therapy can be initiated while the cat is recovering from anesthesia after surgery and is especially beneficial after orthopedic procedures. However, icing can be used for longer periods of time if swelling and pain are still present. Ice should be applied to the treatment area every 4–6 hours for 15–20 minutes. Applying heat, in the form of warm compresses, causes vasodilation and smooth muscle relaxation. Therefore warm compresses are used for pain relief and to decrease muscle spasms. Heat should not be applied during the acute inflammatory phase of healing; instead heat can be applied during chronic inflammation and chronic pain for 15–20 minutes every 6–12 hours.

Range of Motion and Exercise

Passive and active range of motion exercises improve joint integrity, decrease pain, and lubricate joints.³² Passive range of motion is when a practitioner or owner moves the cat's bony segments around a joint axis. This can be done when a cat is unable to ambulate, for example when recovering from neuropraxia. It is important to move the joint into full flexion and full extension to maximize the benefits. Active range of motion is when the cat moves its joints voluntarily, for example when walking, sitting, or jumping. Cats can be motivated to perform active range of motion via the use of treats. Active range of motion allows the cat to move through their joint axes on their own accord and to their own level of tolerance. Owners can be taught these exercises to perform at home.

Environmental Factors

Cats prefer ambient temperatures of 84–100 F, which can be provided with a micro-environment (warm air blankets, warming blankets, and protection from drafts). Environmental modifications are important to consider in cats with osteoarthritis, for example providing steps or ramps so that cats can reach their favorite resting spots.³³ In addition it is important to understand that restraint and handling of these patients will result in pain therefore gentle handling techniques are essential.³⁴

Conclusion

A multimodal approach to feline pain management is important and includes good nursing care, gentle handling, pharmacological and non-pharmacologic analgesic strategies. Every cat is different, therefore careful physical examination and review of concurrent illnesses should be taken into account when planning a pain management protocol. Incorporating more than one analgesic strategy is superior to one alone as this will allow targeting pain from multiple perspectives.

Table 1 Suggested Dosing for Common Pharmaceuticals for the Treatment of Pain in Cats³⁵

Drug	Dosage	Route of Administration
Morphine	0.2–0.4 q 4–6h	IM
Methadone	0.3–0.6 q 4h	IM
Hydromorphone	0.025–0.1 q 4–6h	IM, IV
Fentanyl	Bolus 1–3 µg/kg + CRI 2–3 µg/kg/h	IV
Butorphanol	0.2–0.4 q 1–2h	IM, IV
Buprenorphine	0.02–0.04 q 4–8h	IM, IV, TM
Meloxicam	Acute: 0.3 mg/kg SC once or up to 0.2 mg/kg SC once then 0.05 mg/kg PO q 24h up to 4 d Chronic: 0.1 mg/kg PO once then 0.05 mg/kg PO q 24 hr PRN	Acute: SC, PO Chronic: PO
Robenacoxib	2 mg/kg SC once then 1 mg/kg PO q 24h up to 3 d	SC, PO
Carprofen	2 to 4 mg/kg once only	SC, IV
Procaine 0.5–1%	Up to 6 mg/kg	Local
Prilocaine	Up to 4 mg/kg	Local
Lidocaine 1–2%	Up to 6 mg/kg	Local
Bupivacaine 0.25–0.75%	Up to 1.5 mg/kg	Local
Tramadol	2–4 mg/kg q 6–8h	PO
Gabapentin	5–20 mg/kg q 8–12h	PO

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