Methods for recognising and managing pain in cats

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Summary

PAIN assessment in small animals is not easy but is essential for successful pain management. Pain scoring systems should be used to address pain objectively before selecting the correct treatment for each patient. Individual variations in feline metabolism and a lack of evidence-based clinical studies limit the use of pain relief medication in this species. A multimodal approach, combining drugs that act on different parts of the pain pathway, provides the best results and reduces side effects related to drug administration.

Key words

feline pain score, analgesia, anaesthesia, pain relief, multimodal pain management, adjunctive analgesic therapy

PAIN is a complex and multidimensional experience that involves sensory and emotional components. Although historically it was thought that animals experienced pain differently from humans, or even did not experience pain, it is now known they feel pain but they cannot express it in the same way as us.

As in humans, individual variations in the quality, intensity and response to pain can be identified in feline patients, so our ability to recognise it has to be more accurate to treat it adequately (“to treat

pain it must first be recognised"). Despite the fact that pain recognition is not based on an accurate and objective system, ignoring it is not an option.

Pain assessment is normally based on behavioural deviations rather than objective measures (for example, blood pressure, heart rate, serum cortisol levels), although some clinical studies have tried to identify and use physiological abnormalities presented in some types of pain syndromes (for example, pressure platform gait analysis in musculoskeletal disorders). Pain scoring systems, taking into consideration the animal's behaviour, alertness and interactions, are the best way to address pain in veterinary practice.

Systems have to be reliable, sensitive, quick and easy to perform. Simple descriptive scales, such as a cat's response to an observer's approach, numeric rating scales and visual analogue scales (for example, wound sensitivity after gentle manual palpation) may be used. An example scale is described in Table 1. Deviation from normal behaviour in cats may suggest pain, anxiety or stress. Handling that induces fear and/or aggression should be avoided in these patients as pain sensation may exacerbate clinical signs (Table 2). If pain is suspected, but cannot be addressed because of aggression, anxiety or stress, pain relief administration and later assessment is recommended.

Veterinarians and technicians are responsible for recognising, assessing and preventing pain in animals, and treating it adequately to minimise its negative consequences. Pain assessment should be part of the evaluation of vital signs along with temperature, pulse and respiratory and heart rate, especially in hospital environments.

Pathophysiology of pain

Several neural steps are involved in the processing of noxious signals that can lead to the experience of pain. Initially, a noxious stimulus (mechanical, chemical or thermal insult) is converted into an electrical signal in a phase called transduction, which takes place at the level of specific sensory receptors (nociceptors). These receptors, which only respond to this type of stimulus, do not adapt; therefore, continuous stimulation can occur, leading to decreased threshold and overstimulation (sensitisation). Release of neurotransmitters peripherally leads to reflexes that do not require spinal pathways and contribute to pain sensation.

Transmission of the primary electrical impulse to the spinal cord and then to the thalamus and sensory cortex occurs through two different types of neurons that conduct the signal at different velocities and respond to different stimuli, depending on their nature and intensity. These primary afferent fibres first approach the spinal cord (dorsal root), the first relay point for somatic sensory information. At this point, they form different tracts to send information to the central nervous system (ascending information) and stop in the thalamus, which normally acts as a second relay station, sending impulses from the periphery to the cortex (spinothalamic tract) although this can become a spontaneous pain generator if pain becomes maladaptive.

It is here the second-order cell synapses with the third-order cell, projecting information to the cortex and other parts of the encephalus. Modulation is the third step, which occurs in the cortex in response to the noxious stimulus. Once the information is processed at this level, the stimulus received in the spinal cord can be selectively inhibited, so transmission of the noxious signal to higher centres is modified. This modification occurs after the activation of endogenous pain modulation systems (descending antinociceptive pathways), which are responsible for regulation and stimulate release of endorphins and encephalins. They are located in different areas of the pain pathway (spinal cord, thalamus, cortex, rostroventral medulla). Some of the neurons that form these systems are responsible for the mechanisms of hypo and hyperalgesia. Inadequate pain prevention or management can lead to magnification of pain sensitisation and prolonged effect. If a noxious stimulus is sufficiently intense to prolong pain perception, sensory disturbances might be observed.

Continued pain, hyperalgesia (excessive response to a noxious stimulus) and allodynia (pain perception due to a stimulus that does not normally produce pain) are the result of process changes in the nervous system that occur peripherally and centrally. They can be a component of maladaptive pain. “Wind up” pain (experienced in areas unrelated to the original source) is also the result of an abnormal pain response. Pain also induces a stress response mediated by the endocrine system that increases serum cortisol, catecholamine levels and releases inflammatory mediators.

Tachycardia, vasoconstriction, decreased gastrointestinal motility, delayed healing and sleep deprivation are some of the consequences. Altered pain threshold and mechanisms of peripheral and central sensitisation are related to the release of these inflammatory mediators.

In summary, traditional categorisation of pain that takes into consideration its duration (acute or chronic) may be switched to a more physiological approach, classifying pain as adaptive (normal response to tissue damage that includes inflammatory pain) and maladaptive, where physical changes occur in the spinal cord and brain leading to altered sensory processing patterns.

Pain management

Prevention and early intervention

Pain causes stress and anxiety that can exacerbate sensory perception and lead to undesirable situations. Unintentional pain is commonly identified in cats and can be associated with veterinary procedures. Placing an intravenous catheter or blood sampling may represent a stressful situation. Leaving an animal to interact with its new environment, care during handling and blocking visual access with towels placed over the head may reduce stress and/or aggressive responses. Administration of sedative and/or pain relief drugs at this point may be necessary before pain assessment is undertaken.

Some conditions easily identified in dogs, such as osteoarthritis or intervertebral disc disease, can be overlooked in cats or be described as age-related changes rather than pain (for example, urinary misbehaviour may be linked to painful lower urinary tract disease rather than misconduct).

Pain management and prevention prior to surgery can improve the healing process, reduce hospitalisation time and decrease anaesthetic requirements during induction and maintenance. Adequate analgesia intra and postoperatively can also increase patient comfort and provide better recovery from anaesthesia, preventing the development of maladaptive pain. Initial pain assessment should be followed by ongoing reassessments and revisions of the analgesic plan, titrating treatments up or down depending on the patient's needs.

Return to normal behaviour status may indicate good pain management, so drug selection and dose may need to be reconsidered.

Pharmacologic management

A lack of evidence-based clinical studies and the particularities of feline metabolisms limit the use of some pain relief drugs commonly administered in humans or other animals. Cats have a low capacity to handle drugs that require hepatic glucuronidation. As a consequence, those that depend on this metabolic pathway can achieve high plasma levels (leading to toxicity) or be converted to a less effective metabolite. Classic pain relief drugs used in feline medicine are described in Table 3.

Traditional analgesic drugs (NSAIDs, local anaesthetics, opi oids) are still part of pain management protocols, but new drugs and/or novel routes of administration represent adjunctive analgesic therapy, which can be divided into pharmacologic or non-pharmacologic. Pharmacologic adjunctive analgesic therapy includes the use of drugs indicated for reasons other than pain management, and administration by novel routes. Oral administration of opioids (for example, buprenorphine) and alpha-2 agonists (medetomidine/dexmedetomidine) represents a novel route in cats that can provide up to 100 per cent of bioavailability in plasma through transmucosal uptake.

Adjunctive administration of NMDA-receptor antagonists (for example, ketamine) can be used to avoid perception syndromes like "wind up" pain sensitisation. NSAIDs remain the first choice in chronic pain syndromes, but in my view oral tramadol may be a good alternative when NSAIDs are contraindicated or side effects may be expected. Administration of opioids as part of the anaesthetic protocol may also be accompanied by epidural administration, especially if surgery on the hindlimbs, tail or caudal abdomen is planned. For hospitalised patients and when dealing with acute syndromes, continuous rate infusion (CRI) of a single drug (for example, fentanyl) or a cocktail of synergistic analgesics can be used to provide comfort and avoid dysphoria.

Local anaesthetics used in epidural injections, regional blockage or local infiltration, can also be used in CRI, although care is required in cats. Infiltration of local anaesthetic through an

intravenous catheter in a surgical wound after abdominal surgery or limb amputation is good practice to minimise pain sensitisation in hospitalised animals. Topical creams or patches (local anaesthetics, opioids) are useful to reduce pain sensation in the jugular vein prior to venepuncture or to reduce discomfort associated with surgical wounds.

New analgesic drugs are being introduced with promising results in veterinary medicine. Tricycle antidepressants (amitriptyline) may be recommended in the management of chronic pain conditions, such as osteoarthritis, inflammatory bowel disease or feline interstitial cystitis. Good results have been obtained after using gabapentin perioperatively and to treat neuropathic pain in cats. A multimodal approach using various analgesic drugs simultaneously produces better results than the use of a single agent as it takes advantage of different modes and sites of action in the pain pathway.

Lower doses of each agent can often be used, reducing potential side effects and providing better analgesia. When oral analgesics are provided for non-hospitalised patients, duration of analgesic effect, palatability, ease of administration and owner compliance have to be considered.

Non-pharmacologic adjunctive analgesic therapy includes the use of nutraceuticals (chondroitin sulphate, omega-3 fatty acids), acupuncture, physiotherapy and techniques to minimise stress and anxiety in cats, such as pheromone diffusers, quiet handling, etc).

Some new studies report that the source of pain is inflammation, so it has to be classified based on its inflammatory profile. As a consequence, to treat it appropriately, first we need to determine the profile, inhibit the production of related inflammatory mediators and then select analgesic drugs that act on different parts of the pain pathway.

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