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 Pain Committee guidelines, 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 Pain Committee Guidelines are published in the Journal of Small Animal Practice and is available for open access at the Pain Committee pages of **www.wsava.org.**

ORTHOPAEDIC SURGERY

Orthopaedic surgery has the potential to result in moderate to severe postoperative pain. Surgery should be performed under general anaesthesia combined with aggressive perioperative analgesia. Preventive and multimodal analgesic techniques should be employed for all procedures. The balance between pre-, intra-, and postoperative analgesia will depend on the severity of the preoperative condition and the location and magnitude of surgical trauma, and patient status. Frequent pain assessment should be performed and when pain is not successfully controlled, alternative or additional analgesics or analgesic techniques should be employed to improve patient comfort. NSAIDs provide excellent perioperative analgesia and should be used, unless contraindicated (approved drugs should be preferred). The same NSAID should be used pre- and postoperatively; switching between NSAIDs in the immediate perioperative period should be avoided. Nerve transection (e.g. during limb amputation) or manipulation, may lead to severe pain and development of neuropathic pain and persistent postoperative pain. Gabapentin may be used perioperatively due to a potential benefit in preventing persistent postoperative pain.
The choice of opioid, alpha2 adrenoceptor agonist or NSAID used will vary based on availability, personal preferences and contraindications. Locoregional anaesthetic techniques, locoregional nerve blocks, wound infusion catheters or combinations thereof before and/or after surgery are recommended in all cases. Such techniques should be considered mandatory when opioids and other controlled analgesic drugs are not available. Longer acting local anaesthetic agents such as bupivacaine or ropivacaine are recommended due to their prolonged duration of action. Where available, long-acting formulations of local anaesthetics (e.g. bupivacaine liposomal injectable suspension which may provide analgesia for up to 72 hours) are recommended for incisional anaesthesia for cranial cruciate ligament surgery in dogs. The provision of effective analgesia after the patient is discharged from the hospital is critical.

Protocol for orthopaedic surgery
Preoperative: Combination of an opioid and a NSAID, ± alpha2 adrenoceptor agonist, ± ketamine (cats only).
Intraoperative: Boluses and/or infusions of opioids, alpha2 adrenoceptor agonists, ketamine and/or lidocaine (use cautiously in cats). These drugs may not be required if an effective local anaesthetic block has been performed.
Local Anaesthetic techniques: Locoregional blocks (e.g. RUMM, sciatic-femoral nerve, incisional, brachial plexus block), Neuraxial nerve blocks (e.g. epidural)
Immediate postoperative (24 hours): Combination of a NSAID (if not administered preoperatively) and continue intraoperative infusions or boluses with gradual reduction in doses. Locoregional anaesthetic blocks or wound infusion catheters. Adjunctive analgesics, non-drug therapies (especially cold therapy), careful padding and positioning, and gentle massage of compensatory regions (back, and non-operated limbs)
Later postoperative days: Opioid administration (injectable, transdermal, oral, transmucosal) with titration to effect and gradual discontinuation and/or NSAIDs. Metamizole (dipyrone), Paracetamol (acetaminophen) – *not in cats* and other adjuvant analgesics (e.g. lidocaine patches, gabapentin, amantadine) and nondrug therapies, local anaesthetic administration via a diffusion catheter may be employed until discharge from hospital if needed. Icing of the affected regions should be continued for a minimum of 3 days, at which point it can be alternated with heat therapy prior to stretching and gentle weight-bearing (with icing following these therapies).

Protocol without controlled drugs:
See above, without the opioid. Injectable tramadol may be administered in the perioperative period. The use of local anaesthetic techniques, particularly regional blocks, intravenous lidocaine infusion intra- and postoperative, non-drug therapies combined with NSAIDs becomes critical when opioids are not available.

Protocol with limited availability of analgesic drugs:
See above without the opioid. Non-drug therapies, ketamine, and lidocaine infusions, and acupuncture may be used in the intraoperative period. A combination of low dose alpha2 adrenoceptor agonist, tramadol, NSAID (not if administered preoperatively), non-drug therapies, further regional blocks or continuous wound block (wound catheters) are employed in the immediate postoperative period.
For later postoperative days, NSAIDs are administered as required-paracetamol (acetaminophen) (not in cats) or dypirone, amantadine and/or gabapentin, non-drug therapies are employed. If pain is severe, cannot be controlled with the available resources and is likely to be prolonged, euthanasia should be considered.

Example of a protocol for dogs undergoing femoral fracture repair

Preoperative: NSAID (24-hour dose; ideally one approved for dogs), methadone 0.3 mg/kg IM, acepromazine 0.02-0.03 mg/kg IM
Induction of anaesthesia: propofol to effect IV
Maintenance of anaesthesia: inhalation anaesthesia with lumbosacral epidural administration of bupivacaine 0.5% with morphine (preservative free) 0.1-0.2 mg/kg (1 mL/4 kg up to 6 mL before surgery).
Immediate postoperative (for 24 hours): methadone 0.3 mg/kg IM (every 4-6 hours depending on pain scoring and need for rescue analgesia), icing, range of motion, and other non-drug techniques
Later postoperative days: NSAID (same drug as preoperative, starting 24 hours after preoperative dose) every 24h and gabapentin 5-10 mg/kg PO every 8-12h for up to 14 days after surgery. Continue with non-drug techniques and re-evaluate the need for analgesics at follow-up appointments.

Example of a protocol for cats undergoing femoral fracture repair

Preoperative: NSAID (24-hour dose; ideally one approved for cats), methadone 0.3 mg/kg IM, medetomidine 0.01 mg/kg IM
Induction of anaesthesia: propofol to effect IV
Maintenance of anaesthesia: inhalation anaesthesia with lumbosacral epidural administration of 0.5% bupivacaine with morphine (preservative free) 0.1-0.2 mg/kg (1 mL/4kg up to 6 mL before surgery)
Immediate postoperative (for 24 hours): methadone 0.2-0.3 mg/kg IV (every 4-6 hours depending on pain scoring and need for rescue analgesia), icing, range of motion, and other non-drug therapies
Later postoperative days: Buprenorphine 0.02 mg/kg OTM (or IV if catheter available), every 6-8h for up to 3 days after surgery (where available, the high concentration formulation of buprenorphine (1.8 mg/mL) or the buprenorphine transdermal formulation can be used instead; Table 12). NSAID (same drug as preoperative, starting 24 hours after preoperative dose), every 24h after surgery. Please see labels for approved-NSAIDs for use in cats. Continue with non-drug techniques and re-evaluate the need for analgesics at follow-up appointments.

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

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