

## 6: ANAESTHETIC PROTOCOLS: CASE STUDIES

In this last part of the infographic series of the FECAVA Basic Practices in Veterinary Anaesthesia and Analgesia, we suggest some anaesthetic protocols based on specific case examples, based on our clinical experience. However, dosage regimens and drug protocols should be adapted and adjusted for each patient using an individualised approach and based on physical examination, patient behaviour, degree of pain, pre-existing disease, the procedure and equipment available. ASA scoring may be useful.

You should also be aware of the specific licensed products and indications for each active molecule within the country you practice.

Individual patients may require different approaches; therefore, clinical judgement is important when applying these case examples. The following should be taken into account:

- Anaesthetic protocols are only a part of the anaesthetic plan (infographic 1). Anaesthesia goes much beyond a universal “recipe”. Pre-anaesthetic assessment is crucial, as are monitoring, fluid therapy, emergency intervention, pain management and post-anaesthetic recovery.
- Pre-oxygenation is recommended before anaesthetic induction, particularly in patients with limited physiological reserves (e.g. geriatrics and paediatrics).
- Intubation should be considered on an individual basis, as there are pros and cons, especially when dealing with anaesthesia for spay-neuter programs and short procedures. However, airway protection and ability to provide assisted ventilation are important, particularly when dealing with long/invasive/oral procedures (e.g. dentistry, mastectomy).
- Multimodal analgesia is always recommended; this includes basic local anaesthetic techniques and NSAIDs (if there are no contraindications) (infographics 2 and 3).
- Pain assessment (infographic 2) should ensure that the analgesic techniques and protocols are optimal for pain relief. This ideally involves the use of validated tools.
- Monitoring (infographic 5) is always part of the anaesthetic plan. It does not always involve expensive equipment. Judicious and continuous monitoring throughout anaesthesia by a dedicated individual will certainly decrease anaesthetic-induced morbidity and mortality.
- Emergency equipment should always be in place for each procedure, and drug doses should be pre-calculated. The whole team should be trained and involved with cardiopulmonary resuscitation (CPR). Preplaced intravenous access is good practice for drug and fluid therapy administration and invaluable should CPR be required.
- Hypothermia is a common complication of anaesthesia. This should be prevented by insulation against conductive heat loss (e.g. from a cold surface when patients are placed directly on a metal table), limiting body cavity exposure, using warming systems (that do not burn the patient), by avoiding excessive removal of hair and limiting the wetting from surgical preparation with excessive isopropyl alcohol/scrubbing solutions. The use of low oxygen flows with rebreathing circuits may also help.

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### Case-based protocols

The following case-based approaches are suggestions based on the authors' clinical experience.

#### Case 1: A 10-year old, healthy, calm Labrador undergoing unilateral mastectomy

**Premedication:** Midazolam\* (0.3-0.5 mg/kg) + methadone (0.3-0.5 mg/kg) IM

**Induction:** Alfaxalone to effect (1-3 mg/kg) IV (preoxygenation suggested)

**Maintenance:** Isoflurane (1-2%)

**Analgesia:** Preop NSAID SC + fentanyl infusion (5-20 µg/kg/hour)[intubated patients] or methadone bolus (0.2 mg/kg IV) during surgery according to nociceptive stimulation + 'splash' of lidocaine over incision (up to 8 mg/kg) + postop analgesia with NSAIDs PO +/- opioids. Means of ventilation must be available if using fentanyl infusion.

**Rationale:** This approach can be considered for a geriatric and calm patient without significant systemic disease. It could be also used safely in patients ASA III with minor systemic changes as doses can be adjusted accordingly. Premedication with a benzodiazepine (BDZ) and an opioid provide mild sedation and tranquilisation. If BDZ are not available, an opioid alone can be used for sedation, but doses of alfaxalone would probably be slightly increased without BDZ.

Alfaxalone should be administered slowly (over 60 seconds) and given to effect (i.e. loss of palpebral reflexes and jaw tone, ventral rotation of the eyes). Concentrations of isoflurane will depend on the patient's response to premedication and the use of opioid infusions (e.g. fentanyl) intraoperatively.

There is limited evidence for the use of lidocaine as a "splash" block during mastectomy but there may be limited local analgesia if the drug is not truly absorbed locally. Some anaesthetists now perform tumescent anaesthesia for mastectomy and literature is available elsewhere (Credie et al. 2013). If no contraindications exist, NSAIDs (5-7 days) must be considered as mastectomy is associated with severe inflammation.

#### Case 2: A 6-year old, healthy, fractious cat for dental cleaning + extractions

**Premedication:** Gabapentin\* (100 mg/cat) PO for transportation + medetomidine (15 µg/kg) + methadone (0.3 mg/kg) IM

**Induction:** Propofol IV (3-6 mg/kg) (to effect)

**Maintenance:** Isoflurane (1.5-2%)

**Analgesia:** Preoperative NSAID SC + intraoperative dental blocks with bupivacaine (no more than a total of 2 mg/kg including all blocks) + postoperative analgesia with NSAIDs PO and opioid (consecutive doses of methadone at 0.2 mg/kg IV according to pain assessment).

**Rationale:** Gabapentin has now been used to reduce stress during transportation and facilitate physical examination in feline practice (van Haaften et al. 2017). This is part of the concept that "premedication starts at home". In cats that are fractious, but approachable for an IM injection, the combination of an alpha-2 agonist and an opioid should provide robust, dose-dependent sedation. In this case, the dose of medetomidine takes into consideration the fractious nature of the cat. Dexmedetomidine is an option, if available, instead of medetomidine. Methadone was chosen as several dental extractions could be performed and the procedure would be painful.

Propofol may be given intravenously to effect (alfaxalone or the combination of ketamine-diazepam are also options). Isoflurane concentrations can be adjusted according to the patient's need and anaesthetic monitoring, but isoflurane-sparing should be expected with this premedication protocol.

Local anaesthetic blocks for oral procedures and dentistry were described in infographic 3, with videos available to illustrate these techniques. These may include the infraorbital, maxillary, inferior alveolar and mental blocks. In cats and very small dogs in particular, the volume for the maximum dose of bupivacaine should be calculated (2 mg/kg) and divided by the number of blocks required. Normally, approximately 0.3 mL is used in each block in an adult cat.

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### Case 3: A 4-month old, healthy cat undergoing ovariohysterectomy or orchietomy (spay-neuter program without opioid availability).

If you have no access to opioids – you can still provide good anaesthesia.

#### **Injectable anaesthesia protocol (“kitty magic”):**

Ketamine (4 mg/kg) + dexmedetomidine (40 µg/kg) + midazolam\* (0.25 mg/kg) IM

**Analgesia:** Postoperative NSAID SC or PO + intratesticular anaesthesia with lidocaine or bupivacaine (orchietomy) (0.15 mL per testis for a kitten) OR intraperitoneal anaesthesia with lidocaine (5 mg/kg) or bupivacaine (2 mg/kg)

**Postoperative:** Atipamezole (0.2 mg/kg) IM

**Rationale:** A recent study evaluated the use of opioid-free anaesthetic techniques in cats undergoing ovariohysterectomy (Diep et al. 2020) using non-opioid analgesic techniques and the protocol described above. Premedication, induction and maintenance of anaesthesia are accomplished with intramuscular administration of the drug combination. Onset of anaesthesia is approximately 2 minutes and additional ketamine is not usually required during surgery. Although the protocol may not provide optimal analgesia in adult cats, and use of opioids is recommended if you work in a region that has access to them, a recent study has shown that this drug combination is effective in kittens and they do not require opioids for postoperative analgesia (Malo et al. 2022). Therefore, this would be an excellent approach for injectable anaesthesia for high-volume, high-quality spay-neuter programs when opioids are not available. High (according to data sheet) doses of dexmedetomidine are used for muscle relaxation, sedation, analgesia and surgical anaesthesia in combination with low doses of ketamine. It is not clear precisely how much the midazolam contributes to the anaesthetic protocol. However, after the administration of atipamezole (at least 30 minutes after the administration of the “kitty magic”), midazolam, in theory, should be able to prevent any residual cataleptic effects of ketamine, including hyperesthesia.

Most NSAIDs are not authorised for cats younger than 6 months but several studies have reported their use in kittens at approximately 12 weeks of age or older. The local anaesthetic techniques reported above are described in detail in infographic 3 and videos are available to illustrate these techniques.

### Case 4: Routine clinic ovariohysterectomy or orchietomy for a 1-year old, healthy, energetic, dog

**Premedication:** Acepromazine 0.03 mg/kg or medetomidine 0.01 mg/kg and methadone 0.3 mg/kg IM

**Induction:** Propofol IV to effect (~4 mg/kg) or alfaxalone IV to effect (~2 mg/kg)

**Maintenance:** Isoflurane or sevoflurane in oxygen via intubated trachea.

**Analgesia:** Postoperative NSAID SC or PO + intratesticular anaesthesia with lidocaine or bupivacaine (orchietomy) OR intraperitoneal anaesthesia with lidocaine or bupivacaine

**Postoperative:** NSAID orally 2-3 days. Repeat methadone or buprenorphine at discharge.

Local anaesthetic techniques should always be used as part of multimodal analgesia. These are described in detail in infographic 3 and videos are available to illustrate the techniques. NSAIDs can be used safely when they are not contra-indicated; this is usually the case in young healthy animals. Hypotension and hypovolaemia must be prevented during surgery by monitoring and fluid infusion. Acepromazine (ACP) is popularly used for premedication in combination with opioids. ACP may be considered for tranquilisation of dogs and cats, especially in elective cases when patients are not dehydrated, hypovolemic or at risk of bleeding, as ACP can cause vasodilation and prolonged hypotension. On the other hand, it can decrease inhalant anaesthetic requirements and smooth anaesthetic recovery. For example, it could be used in case 1 (if bleeding is not a risk) and 2 (if cat is not fractious).

\* Indicates no licensed veterinary formulation available for cats and dogs

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### References

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