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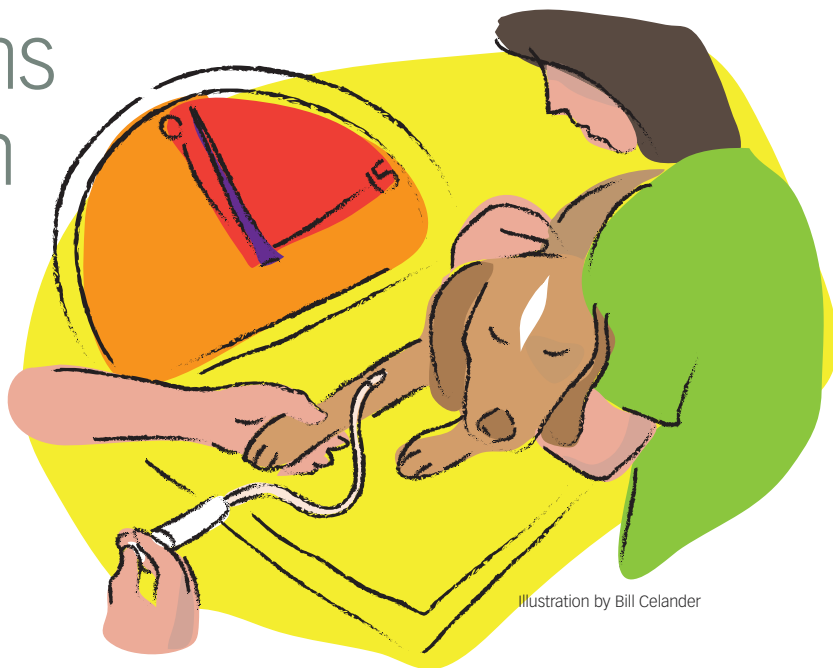North Carolina State University

Peer Reviewed

Anesthetic Options for Short-Duration Procedures

You have asked…

What anesthetic protocols can I use for procedures that take about 15 minutes?

Illustration by Bill Celander

The expert says…

Dogs and cats are routinely anesthetized for reasons ranging from chemical restraint for short-duration procedures to lengthy, painful surgical procedures. General anesthesia is often preferred to heavy sedation because it prevents patient movement, allowing procedures to be performed quickly and easily. Anesthesia should be administered in a way that maximizes patient survival, minimizes pain and anxiety, and results in minimal physiologic side effects.

Special consideration is required to design a plan for administering anesthesia during short-duration procedures (<15 minutes). As with any anesthetic event, the patient should be evaluated to determine whether anesthesia is appropriate. Special attention should be given to the cardiovascular and respiratory systems while conducting a complete examination and evaluating the patient history.

The need for biochemical assessment is often based on the patient's history, age, and disease; however, at minimum, packed cell volume, total solids, blood urea nitrogen, and glucose levels should be evaluated. Many veterinarians may believe that if the anesthetic time is short, these tests can be skipped. Although there is evidence that longer and more involved procedures place dogs at greater risk, short-duration procedures are not inherently safe.[1] Anesthesia used during short-duration procedures can contribute to complications and even death. Likewise, shortcuts should not be taken with anesthetic monitoring just because anesthetic time is brief: the risks for cardiovascular and respiratory derangements are still present.

PRELIMINARY MEASURES
Step 1
Determine whether the procedure is expected to lead to either short- or long-term pain. If pain is a reasonable expectation, preemptive analgesia is recommended when feasible. Most induction agents and inhalants do not interfere with the pain pathway; rather, they prevent higher brain centers from perceiving pain.

Special attention should be given to cardiovascular and respiratory systems while conducting preliminary examinations.

CONTINUES

Step 2

Maintain an adequate level of concern for protecting the airway. Consideration must be given to the disease (eg, chronic vomiting), feline or canine breed (eg, Persian, bulldog), and drugs being used (eg, propofol). Protecting the airway with an endotracheal tube does not necessitate using gas anesthetics; however, supplemental oxygen is more efficiently administered when the patient is intubated.

Step 3

Estimate when the patient is expected to return to function. For example, a cat scheduled to spend the day and/or night in the hospital may not need to be fully functional, but a mastiff that is scheduled for early discharge and needs to climb steps into its home may require different considerations.

RECOMMENDED PROTOCOLS

1. Propofol +/- Sedative +/- Analgesia

Propofol is a reasonable choice for short-duration procedures; it is quickly metabolized and patients recover rapidly with minimal central nervous system (CNS) depression. I prefer to administer propofol through a catheter, especially if additional amounts may be required, and recommend endotracheal intubation. Although not all patients receiving propofol must be intubated, a veterinarian *must* be able to intubate a patient if apnea or airway difficulties arise (which is always possible with propofol).

Depending on the procedure, propofol can be used as a single agent with or without additional delivery by bolus or constant-rate infusion (CRI). A propofol product with an extended shelf life (Propoflo-28, abbottanimalhealth.com) has recently been approved for use in veterinary patients. However, this product contains the preservative benzyl alcohol and therefore has not been labeled for CRI, bolus administration, or use in cats.

For patients undergoing short but potentially painful procedures, administration of propofol following premedication with an opioid (eg, butorphanol or hydromorphone) would be appropriate. (Note that propofol has no intrinsic analgesic properties.) Propofol may also be administered following a nonanalgesic sedative (eg, acepromazine). With sedative or opioid administration, lower doses of propofol and extended anesthetic duration are possible. Long-duration CRIs of propofol in cats may cause formation of Heinz bodies; however, this should not be a problem if the procedure takes less than 15 minutes.[2,3] Propofol should always be given to effect.

2. Dexmedetomidine & Ketamine +/- Opioid

The combination of an α_2-agonist such as dexmedetomidine and ketamine is commonly used in companion animals. Administration of these 2 drug classes produces reliable results, provides analgesia, and allows intramuscular administration, which can be particularly useful for some patients. Recent studies have shown that a combination of dexmedetomidine (a common α_2-agonist), ketamine, and an opioid can provide smooth and rapid anesthesia (<10 minutes).[4]

Traditionally, anesthetists use caution when reversing dexmedetomidine after combination

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PROPOFOL DOSE SCHEDULE

- Recommended dose in dogs and cats is approximately 6 mg/kg IV given effect:
- Dose may be decreased (closer to 3–4 mg/kg IV) in patients that have been:
  —Premedicated with an opioid: Butorphanol 0.2 mg/kg IM *or* Buprenorphine 0.02 mg/kg IM *or* Hydromorphone 0.1 mg/kg IM
  —Premedicated with a sedative: Acepromazine 0.02 mg/kg IM *or* Dexmedetomidine 5–15 µg/kg IM
- After propofol induction, can keep patient anesthetized with:
  —Additional propofol boluses of approximately 0.5–1 mg/kg IV
  —CRI propofol at 0.1–0.4 mg/kg/min
  —Gas anesthetics

CNS = central nervous system, CRI = constant-rate infusion

with ketamine due to concerns about an agitated or rough recovery associated with solo use of ketamine (a dissociative anesthetic). However, a recent study showed that when low doses of ketamine were used (3 mg/kg with dexmedetomidine), reversal with atipamezole resulted in smooth recoveries.[4] However, reversing dexmedetomidine also reverses its analgesic properties.

Following anesthetic induction, patients should be monitored for hypoventilation and the need for oxygen supplementation or intubation, especially if there are underlying airway concerns. If this drug combination results in inadequate anesthesia, additional gas anesthesia (eg, isoflurane) may be administered. α_2-Agonists should be used with caution in patients with significant cardiovascular disease.

See Aids & Resources, back page, for references & suggested reading.

DEXMEDETOMIDINE/ KETAMINE DOSE SCHEDULE

- For both dogs and cats:
  - —Dexmedetomidine 5–15 μg/kg IM

  Plus

  —Ketamine 3–5 mg/kg IM

  Plus/Minus

  —Opioid:
  Butorphanol 0.2 mg/kg IM *or*
  Buprenorphine 0.02 mg/kg IM *or*
  Hydromorphone 0.1 mg/kg IM

- In dogs, dexmedetomidine can be reversed with atipamezole at 150 μg/kg IM or with a volume (mL) of atipamezole equal to the volume of dexmedetomidine given.
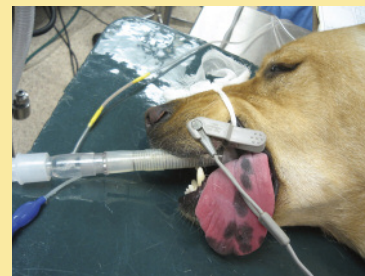
Should I Use Gas Anesthetics Alone?

On casual inspection, sole use of gas anesthetics (ie, isoflurane, sevoflurane) appears to be a reasonable and easy option, but "masking" patients with inhalants may not be desirable. Induction with gas anesthetics alone may result in:

- Increased patient stress (increased sympathetic tone)
- Delay in gaining control of the airway (increased risk for hypoventilation and aspiration)
- Risk for increased cardiovascular depression
- Increased risk for death[1]

In addition, gas anesthetics do not interrupt the pain pathway. When a patient is anesthetized, the cerebrum is "asleep" and any pain signal that reaches the higher brain centers is not consciously perceived. However, as soon as the patient recovers from anesthesia, the activated pain pathway is then fully perceived.

Although I use gas inhalants alone for induction, those instances are infrequent.

WANT MORE?

Read **Anesthesia Monitoring: Raising the Standards of Care** by Dr. Elisa Mazzaferro in the August 2011 issue of *Clinician's Brief* at **cliniciansbrief.com/journal**