

Top 5 Short Procedure Sedation Scenarios

Khursheed Mama, DVM, DACVAA
Colorado State University



Sedation can be used to facilitate management of aggressive animals, completion of minor procedures (eg, biopsy, laceration repair, bandage change), and diagnostic imaging. However, sedation may not be safer than general anesthesia in all cases (eg, brachycephalic patient with significant stertor/stridor), as is often presumed.^{1,2} A thorough history, assessment of animal temperament, physical examination (except with aggressive animals), and age- and disease-appropriate laboratory data should be obtained or performed before a sedation protocol is developed.^{3,4} The level of desired sedation and route of drug administration also influence selection.

It is strongly recommended that patients receive support and that physiologic parameters are monitored during sedation. Oxygen administration via a facemask or endotracheal tube can be considered if the patient is not able to protect its airway.^{2,4} Intubation supplies should be readily available during procedures that require heavy sedation. In cases in which sedation duration is to exceed 30 to 45 minutes or the patient would benefit from fluids (eg, elevated BUN and creatinine),

fluids should be administered either intravenously following placement of a catheter or, at minimum, subcutaneously.^{3,4} External heat should be provided when warranted to maintain the patient's body temperature.

TOP 5 SHORT PROCEDURE SEDATION SCENARIOS

1. Young-to-Middle-Aged, Healthy Dog with No Pre-Existing Disease or Deterioration in Organ Function Undergoing a Nonpainful or Only Mildly Painful Minor Procedure (eg, Ultrasonography, Bandage Change)
2. Older, Debilitated, Cardiovascularly Compromised Dog or a Dog with Significant Organ Dysfunction
3. Young-to-Middle-Aged, Healthy Cat with No Pre-Existing Disease or Deterioration in Organ Function Undergoing a Nonpainful or Only Mildly Painful Procedure (eg, Ultrasonography, Bandage Change)
4. Older, Debilitated, Cardiovascularly Compromised Cat
5. Fractious or Aggressive Dog or Cat Requiring Sedation

The level of monitoring necessary should be determined based on individual patient risk; at minimum, body temperature, heart rate, and respiratory rate should be obtained and recorded at fixed intervals. ECG, Doppler or other non-invasive blood pressure monitoring, and pulse oximetry can provide useful information and should be used in higher risk animals.^{3,4} Maintaining a sedation record is advised and can help guide subsequent management. Although reversal of drugs is sometimes necessary, the patient's temperament and pain should always be considered.

Sedation protocols may include a tranquilizer (eg, acepromazine) or sedative (eg, dexmedetomidine), an opioid for analgesia and sedation (in dogs), and, if warranted, an anesthetic agent. Onset and duration, route of administration, desired depth of sedation, procedure, and need for reversibility should all be considered.

Sedation is aimed at facilitating completion of the procedure without causing undue stress to the patient or veterinary staff. Drugs should provide adequate calming, pain relief (if needed), and reduction in mobility appropriate to the procedure.

Following are the author's top 5 scenarios involving sedation for short procedures. Drug dose information reflects what is commonly used at the author's hospital. Additional drug-specific information may be found in *Suggested Reading*, page 30.

1 Young-to-Middle-Aged, Healthy Dog with No Pre-Existing Disease or Deterioration in Organ Function Undergoing a Nonpainful or Only Mildly Painful Minor Procedure (eg, Ultrasonography, Bandage Change)

Sedation

▶ Butorphanol (0.1-0.3 mg/kg IV or 0.3-0.5 mg/kg IM) + dexmedetomidine (0.001-0.003 mg/kg IV or 0.003-0.006 mg/kg IM); partial (eg, buprenorphine) or complete μ -opioid agonists (eg, morphine) may be substituted for butorpha-

nol for noxious procedures. Doses for either drug class may be adjusted.

▶ Acepromazine (0.01-0.03 mg/kg IV or 0.02-0.05 mg/kg IM or SC) may be used for tranquilization instead of dexmedetomidine if vasoconstriction and bradycardia are not desired. Acepromazine offers no analgesic effects and is not reversible. Duration may be prolonged in dogs with hepatic disease.⁵

Of note, sudden arousal may be observed in patients that receive dexmedetomidine. These effects can be mitigated with the addition of an opioid.^{6,7} Bradycardia should be expected with dexmedetomidine and opioid combinations.^{7,8} Second-degree heart block is also commonly observed. If dexmedetomidine-mediated vasoconstriction is the presumed cause of hypertension and resulting bradycardia or bradyarrhythmia, anticholinergics are not recommended, as they increase myocardial work without improving cardiac output or tissue perfusion.⁸ Oxygen should be administered when using this combination.

Reversal

▶ Naloxone (starting at 0.001-0.002 mg/kg IV or 0.005 mg/kg SC; up to 0.01 mg/kg SC or IV to effect) to reverse opioid effects. Reversal should only be attempted if residual analgesia is not considered important or is provided using other medications. The partial μ -opioid agonist buprenorphine is not generally considered to be reversible.⁹

▶ Atipamezole (0.05-0.10 mg/kg IM) can be used to reverse the effects of dexmedetomidine. As duration from dexmedetomidine administration increases, lower doses of atipamezole are often sufficient to reverse residual drug effects.

Sudden arousal may be observed in patients that receive dexmedetomidine.

2 Older, Debilitated, Cardiovascularly Compromised Dog or a Dog with Significant Organ Dysfunction

Sedation

- Butorphanol (0.2-0.3 mg/kg IV) ± midazolam (0.1-0.3 mg/kg IV)
- Fentanyl (0.002-0.005 mg/kg IV), hydromorphone (0.02-0.05 mg/kg IV), or methadone (0.1-0.2 mg/kg IV) may be substituted for butorphanol. These medications may also be administered IM or SC at higher doses.

Bradycardia should be expected with administration of high doses of opioids. Opioid-induced bradycardia may be treated with atropine (0.01-0.02 mg/kg) or glycopyrrolate (0.005-0.010 mg/kg IV). An IV catheter is recommended, and oxygen should be administered. Occasionally, an animal might become excited or dysphoric.^{10,11} Respiratory depression is likely with IV administration of these drug combinations, especially in debilitated patients.¹¹ Panting may also be observed and may complicate certain procedures (eg, ultrasound-guided aspiration of the spleen). Slow IV titration of an appropriate injectable anesthetic (eg, propofol, alfaxalone) may mitigate these complications; however, because apnea is also possible, intubation supplies should be readily available.

Bradycardia should be expected in patients that receive dexmedetomidine and opioid combinations.

Reversal

- Naloxone (up to 0.01 mg/kg IM, SC, or IV to effect; see *Suggested Reading*, page 30, for more information on appropriate administration)
- Flumazenil at 0.01 mg/kg has been suggested; however, in the author's experience, lower amounts (0.05-0.10 mg titrated IV) are sufficient for reversal of benzodiazepine effects.

3 Young-to-Middle-Aged, Healthy Cat with No Pre-Existing Disease or Deterioration in Organ Function Undergoing a Nonpainful or Only Mildly Painful Procedure (eg, Ultrasonography, Bandage Change)

Sedation

- Butorphanol (0.1-0.3 mg/kg IV or 0.3-0.5 mg/kg IM) + dexmedetomidine (0.002-0.004 mg/kg IV or 0.004-0.010 mg/kg IM) ± ketamine or alfaxalone (1-3 mg/kg IM). This combination may sometimes be referred to as *kitty magic*.
- Partial or complete μ -opioid agonists may be substituted for butorphanol for noxious procedures.

In cats, sedation does not occur as reliably with opioids as compared with dogs, and cats may become euphoric or dysphoric.¹² Clinical experience suggests that although butorphanol is useful for a short duration and treatment of mild pain, it is the most sedating of the opioids in cats. Bradycardia should be expected in patients that receive dexmedetomidine and opioid combinations (see note about anticholinergic use in *Scenario 1*, previous page). Alfaxalone can cause seizure-like twitching and noise sensitivity¹³; thus, cats should be kept in a dimly lit, quiet area during recovery from this drug. Oxygen should be administered.

Reversal

- Naloxone (up to 0.01 mg/kg IM, SC, or IV to effect; see *Suggested Reading*, page 30, for more information on appropriate dosing)
- Atipamezole (0.05-0.10 mg/kg IM)
- Neither ketamine nor alfaxalone is reversible.

4 Older, Debilitated, Cardiovascularly Compromised Cat

Sedation

- ▶ Butorphanol (0.1-0.3 mg/kg IV or 0.3-0.5 mg/kg IM) ± midazolam (0.1-0.2 mg/kg IV or IM) ± alfaxalone (1-2 mg/kg IM)
- ▶ Fentanyl (0.002-0.003 mg/kg IV), hydromorphone (0.01-0.02 mg/kg IV), or methadone (0.1-0.2 mg/kg IV) may be substituted for butorphanol.

Nondebilitated cats can become excited with opioids and benzodiazepines.^{13,14} See previous note regarding considerations when using alfaxalone. Ketamine may be used in place of alfaxalone in cats, but caution is advised in cats with hypertrophic cardiomyopathy.¹⁵ Oxygen is recommended.

Reversal

- ▶ Naloxone (up to 0.01 mg/kg IM, SC, or IV to effect)
- ▶ Flumazenil (0.025 mg IV in increments to effect)

5 Fractious or Aggressive Dog or Cat Requiring Sedation

Pet owners should always be informed of the added risk of sedating animals without an evaluation. For a patient with an aversion to the veterinary hospital, prior administration of tranquilizers (eg, trazodone in dogs, gabapentin in cats) may be helpful.^{16,17}

Efficient handling of fractious patients is needed to minimize stress to the veterinary staff, pet owner, and patient. Knowledge of the patient's weight is helpful in planning and having medications ready for administration to minimize wait time. In many scenarios, a sedative or tranquilizer and opioid are not sufficient to safely approach these patients, and the addition of an anesthetic agent is warranted. Dose adjustments to the protocols in Scenarios 1 through 4 may be necessary:

Scenario 1

- ▶ Dexmedetomidine (0.005-0.020 mg/kg IM) ± opioid (eg, butorphanol [0.2-0.5 mg/kg IM]) ± anesthetic agent (eg, ketamine [2-5 mg/kg IM])

This combination provides good analgesia but may not be effective in patients that are already “worked up.” The addition of ketamine may increase reliability. Cardiovascular depression is likely.

Scenario 2

- ▶ Tiletamine-zolazepam (cats, 3-5 mg/kg; dogs, 5-7 mg/kg IM or SC)

The small volume typically makes administration easier as compared with drugs that require a larger volume. If dosed appropriately, this combination is reliable, with heavy sedation typically occurring in 5 to 10 minutes. However, this drug combination provides minimal analgesia and has a long duration of action. Adverse behaviors and hyperthermia may be seen during recovery if additional sedatives or tranquilizers are not administered following short (ie, <1 hour) procedures.

Scenario 3

- ▶ Tranquilizer (eg, midazolam [0.2 mg/kg IM]) + anesthetic agent (eg, alfaxalone [1-3 mg/kg IM])

This combination is useful (but not 100% reliable) in compromised, fractious cats. It consists of a large volume and does not provide any analgesia, but analgesics can be provided after the patient is recumbent or added to the other medications if the drug volume is not a limiting factor.

Scenario 4

Although chamber/mask inductions using inhalation agents are no longer recommended for routine use, they may be a viable alternative for a cat or small dog that is challenging to handle. Administration of an injectable sedative can help reduce the

Nondebilitated cats can become excited with opioids and benzodiazepines.^{13,14}

stress of this type of induction but is not always possible. However, as soon as the patient can be handled, it should be removed from the chamber and maintained on a mask. Additional drugs may be administered at this time. The patient can also be evaluated and/or monitored and provided supportive care.

Conclusion

Sedation provides a convenient mechanism for facilitating minor procedures in dogs and cats but is not without risk. Vigilance in monitoring and adequate support, along with appropriate drug selection, are key to ensuring animal and veterinary staff safety. ■■■

References

1. Koch D, Arnold S, Hubler M, Montavon PM. Brachycephalic syndrome in dogs. *Comp Cont Educ Pract*. 2003;55(1):48-55.
2. Krein S, Wetmore LA. Breed-specific anesthesia. *Clinician's Brief*. 2012;10(3):17-20.
3. Epstein M, Kuehn NF, Landsberg G, et al. AAHA senior care guidelines for dogs and cats. *J Am Anim Hosp Assoc*. 2005;41(2):81-91.
4. Bednarski R, Grimm K, Harvey R, et al. AAHA anesthesia guidelines for dogs and cats. *J Am Anim Hosp Assoc*. 2011;47(6):377-385.
5. Mama KR. Acepromazine. *Plumb's Therapeutics Brief*. 2016;3(2):8-9.
6. Paolo S. Use of dexmedetomidine in veterinary practice. *Int J Clin Anesthesiol*. 2017;5(4):1078-1080.
7. Granholm M, McKusick BC, Westerholm FC, Aspergrén JC. Evaluation of the clinical efficacy and safety of dexmedetomidine or medetomidine in cats and their reversal with atipamezole. *Vet Anaesth Anal*. 2006;33(4):214-223.
8. Congdon JM, Marquez M, Niyom S, Boscan P. Evaluation of the sedative and cardiovascular effects of intramuscular administration of dexmedetomidine with and without concurrent atropine administration in dogs. *J Am Vet Med Assoc*. 2011;239(1):81-89.
9. Gal TJ. Naloxone reversal of buprenorphine-induced respiratory depression. *Clin Pharmacol Ther*. 1989;45(1):66-71.
10. Becker WM, Mama KR, Rao S, Palmer RH, Egger EL. Prevalence of dysphoria after fentanyl in dogs undergoing stifle surgery. *Vet Surg*. 2013;42(3):302-307.
11. McNicol E. Opioid side effects. *Pain Clinical Updates*. 2007;15(2):1-6.
12. Bortolami E, Love EJ. Practical use of opioids in cats: a state-of-the-art, evidence based review. *J Feline Med Surg*. 2015;17(4):283-311.
13. Warne LN, Beths T, Whittem T, Carter JE, Bauquier SH. A review of the pharmacology and clinical application of alfaxalone in cats. *Vet J*. 2015;203(2):141-148.
14. Ilkiw JE, Suter CM, Farver TB, McNeal D, Steffey EP. The behaviour of healthy awake cats following intravenous and intramuscular administration of midazolam. *J Vet Pharmacol Ther*. 1996;19(3):205-216.
15. Mama KR. Ketamine. *Clinician's Brief*. 2018;16(1):31-33.
16. van Haften KA, Forsythe LRE, Stelow EA, Bain MJ. Effects of a single preappointment dose of gabapentin on signs of stress in cats during transportation and veterinary examination. *J Am Vet Med Assoc*. 2017;251(10):1175-1181.
17. Gruen ME, Sherman BL. Use of trazodone as an adjunctive agent in the treatment of canine anxiety disorders: 56 cases (1995-2007). *J Am Vet Med Assoc*. 2008;233(12):1902-1907.

Suggested Reading

- Bennett K, Egger C. Top 5 tips for sedation and anesthesia in fractious dogs. *Clinician's Brief*. 2018;16(11):36-41.
- Grimm KA, Lamont LA, Tranquilli WJ, Greene SA, Robertson SA, eds. *Veterinary Anesthesia and Analgesia: The Fifth Edition of Lumb and Jones*. Ames, IA: John Wiley and Sons; 2015.
- Plumb DC. *Plumb's Veterinary Drug Handbook*. 9th ed. Hoboken, NJ: Wiley-Blackwell; 2018.

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