



Suggested Sedation for Echocardiography

Many dogs and cats tolerate a full echocardiographic study without sedation. However, sedation may become necessary when the exam is made difficult by a restless patient (wriggling or panting) or a stress-induced tachycardia. Although sedation may affect some echocardiographic measurements, the magnitude of observed changes in sedated dogs and cats using the following suggested sedative combinations is insufficient to affect the diagnosis. Stress itself (from the visit, fur clipping or being held in recumbency) has negative consequences for the pet and the safety of those around the animals must be taken into account as well. Dyspnoeic patients also benefit from some mild sedation – they are less likely to panic which leads to worsening dyspnoea and can instigate fatal arrhythmias.

The following are suggested sedation drugs and protocols based on my experience, after discussion with cardiologists and reading the evidence. The choice of drug and protocol remains with the case vet who knows the pet and their full clinical history. Some of these drugs are off-licence or used in ways that makes them off-licence – I recommend off-licence consent is obtained from the pet's owner.

Dogs

Do NOT give alpha-2 agonists³ – these severely affect cardiac function and echocardiography measurements obtained.

Trazodone (5–15 mg/kg, orally) may be given both the night before and 1 hour before travel or arrival at the practice if the dog is known to be anxious in the practice.

My preference is to give butorphanol 0.2mg/kg IV – this acts within 10 minutes of administration and is more consistent than giving it IM. This is not a potent sedative so a fractious patient may need more.

The following combined IM^{1,2} if unable to place an IV catheter – do not give if the patient is bradycardic.

- Butorphanol 0.2mg/kg
- Midazolam 0.2mg/kg

Alfaxalone IM⁴ can be very useful and has minimal cardiac effects too, combine with midazolam otherwise restless recovery. Due to the volumes, this is only useful for dogs <10 kg. Careful titration of alfaxalone at 1 mg/kg IV increments is useful if an IV catheter can be placed.



Cats ^{5, 6, 7}

Avoid ketamine in cats with diagnosed or suspected Hypertrophic Cardiomyopathy as it increases myocardial oxygen demand. Do NOT give alpha-2 agonists³ – these severely affect cardiac function and echocardiography measurements obtained.

If a cat is known to be predisposed to anxiety and subsequent uncooperative behaviour, pre-emptive at-home sedation with gabapentin (50mg if < 3kg, 100mg if 3.5-5kg, 150mg if >5kg, PO, about 20mg/kg, 2-3 hours before leaving home and at least 90 minutes before visit) is very useful.^{8,9} This sedation works better if a dose of gabapentin is given the evening before the visit and scan. This dose should be decreased by half (10mg/kg) for cats with chronic kidney disease (IRIS stage 2 or 3).¹⁰ Cats who have been administered gabapentin should be kept inside for a minimum of 12 hours post administration and owners should be warned about that their cat is likely to be ataxic and so should stop their cat having access to stairs or jumping.

The following drugs combined:

Alfaxalone 1-2mg/kg + midazolam 0.3mg/kg IM

OR

Butorphanol 0.2mg/kg + Alfaxalone 1-2mg/kg + midazolam 0.2mg/kg IM

OR

Alfaxalone IV to effect (0.1ml increments as needed) – can give above as initial sedation in order to place an IV catheter, administering some midazolam improves sedation and recovery.

Avoid midazolam in sedation protocol if patient is healthy/vigorous because of paradoxical excitation.

References

1. <https://www.sciencedirect.com/science/article/abs/pii/S1938973621000465> Geovana Possidonio, Carolyn A. Santos, Mariana A. Ferreira, Beatriz P. Floriano, Breno F.M. de Almeida, Ana Elisa G.W. Marques, Marcel G. Marques; Echocardiographic Assessment of Healthy Midazolam/Butorphanol or Midazolam/Morphine-Sedated Dogs; Topics in Companion Animal Medicine; Volume 45, 2021, 100553.
2. <https://doi.org/10.1590/0103-8478cr20150456>
3. J Vet Cardiol, 2015 Dec;17(4):282-92
4. <https://www.koreascience.or.kr/article/JAKO201503264233026.pdf>
5. <https://www.idexx.com/files/sedating-patients-for-ecg-recordings-en.pdf>



6. Ward JL, Schober KE, Fuentes VL, Bonagura JD. Effects of sedation on echocardiographic variables of left atrial and left ventricular function in healthy cats. *J Feline Med Surg.* 2012 Oct;14(10):678-85. doi: 10.1177/1098612X12447729. Epub 2012 May 10. PMID: 22577049.
7. <https://alfaxan.co.uk/news/intramuscular-alfaxalone-in-the-cat> - alfaxalone shows excellent cardiovascular stability.
8. <https://doi.org/10.5326/JAAHA-MS-7081> Meghan E. Allen, Nicole L. LeBlanc, Katherine F. Scollan; Hemodynamic, Echocardiographic, and Sedative Effects of Oral Gabapentin in Healthy Cats. *J Am Anim Hosp Assoc* 1 November 2021; 57 (6): 278–284.
9. 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 Nov 15;251(10):1175-1181. doi: 10.2460/javma.251.10.1175. PMID: 29099247.
10. Quimby JM, Lorbach SK, Saffire A, Kennedy A, Wittenburg LA, Aarnes TK, Creighton KJ, Jones SE, Paschall RE, King EM, Bruner CE, Wallinger JN, van Haften KA. Serum concentrations of gabapentin in cats with chronic kidney disease. *J Feline Med Surg.* 2022 Dec;24(12):1260-1266. doi: 10.1177/1098612X221077017. Epub 2022 Feb 23. PMID: 35195476; PMCID: PMC9395545.
11. Simon BT, Steagall PV. Feline procedural sedation and analgesia: When, why and how. *Journal of Feline Medicine and Surgery.* 2020;22(11):1029-1045. doi:10.1177/1098612X20965830