
1. PURPOSE

This Standard Operating Procedure (SOP) describes methods for anesthetizing dogs.

2. RESPONSIBILITY

Principal Investigators (PIs) and their research staff and veterinary care staff.

3. INTRODUCTION

- 3.1. Perform a thorough physical exam and obtain an accurate body weight.
- 3.2. Withdraw food (not water) for 12 hours prior to anesthesia in order to reduce the risk of aspiration of stomach contents. Very young animals (less than 10 weeks) and/or small animals (less than 2 kg) should be fasted for only 1 to 2 hours due to the risk of hypoglycemia.
- 3.3. Keep animals warm by providing a heat source until the animal has recovered from anesthesia.
- 3.4. Never leave an anesthetized animal unattended.

4. MATERIALS

- 4.1. Material or equipment to provide or conserve body heat (e.g. warm-water circulating pad)
- 4.2. Ophthalmic ointment (natural tears)
- 4.3. Gas anesthesia machine (calibrated within the last 12 months) with adequate gas scavenging system or filter
- 4.4. Tight-fitting mask
- 4.5. Isoflurane
- 4.6. Sevoflurane
- 4.7. Butorphanol (10mg/mL) *Controlled drug
- 4.8. Buprenorphine (0.3mg/mL) *Controlled drug
- 4.9. Hydromorphone (2mg/ml) *Controlled drug
- 4.10. Carprofen (50mg/ml) or Meloxicam (5mg/ml)
- 4.11. Acepromazine (10mg/mL)
- 4.12. Glycopyrrolate (0.2mg/mL)
- 4.13. EMLA cream
- 4.14. Intravenous catheter
- 4.15. Ketamine (100mg/mL) *Controlled drug
- 4.16. Diazepam (5mg/mL) *Controlled drug
- 4.17. Midazolam (5 mg/ml)
- 4.18. Dexmedetomidine (0.5mg/ml)
- 4.19. Pentobarbital (54.7mg/kg) *Controlled drug
- 4.20. Pentothal powder *Controlled drug
- 4.21. Propofol (10mg/mL)
- 4.22. Sterile isotonic saline (0.9% saline) or Lactated Ringer's Solution (LRS)
- 4.23. Xylocaine spray
- 4.24. Sterile lubricant (e.g. water soluble jelly)

4.25. Endotracheal tubes, cuffed, various sizes.

4.26. Laryngoscope

4.27. Plain gauze rolls

5. PROCEDURES

5.1. Premedication:

5.1.1. Administer, subcutaneously or intramuscularly (can be mixed in the same syringe):

5.1.1.1. For minor to moderately invasive surgeries: buprenorphine 0.01 to 0.02mg/kg

5.1.1.2. For more invasive surgeries: hydromorphone 0.05 to 0.2mg/kg

5.1.1.3. Acepromazine: 0.05 to 0.1mg/kg or midazolam 0.2 to 0.4m/kg

5.1.1.4. Give NSAIDs such as carprofen 4mg/kg SC or meloxicam 0.2mg/kg

5.1.1.5. Calculate the dose of glycopyrrolate (0.01 to 0.02mg/kg) and administer if the heart rates goes below 80bpm during anesthesia.

5.2. Intravenous (IV) catheter placement:

5.2.1. To provide IV fluid therapy and venous access during surgery.

5.2.2. Apply EMLA cream and cover with plastic cling wrap (e.g. Saran® wrap) over the venipuncture site at least 15 minutes prior to placing the catheter. Observe the animal or apply a device (e.g. Elizabethan collar) to prevent the dog from removing or swallowing the plastic.

5.2.3. Insert IV catheter and secure in one of the following locations:

5.2.3.1. For peripheral IV access sites: use either the cephalic or saphenous vein.

5.2.3.2. For central venous access site: use the external jugular vein.

5.3. IV fluid administration:

5.3.1. Administer isotonic saline (0.9% saline) or Lactated Ringer's Solution at a rate of 10mL/ kg//hour.

5.4. Induction and injectable anesthesia:

5.4.1. Can be used alone for short, non-invasive procedures.

5.4.2. Used for induction prior to use of isoflurane anesthesia for smooth and rapid induction and to facilitate intubation.

Drug	Dose	Route	Duration of Effect	Notes
Ketamine-Diazepam	3mg/kg - 0.3m/kg	IV	20 minutes	May be mixed in same syringe, Laryngeal reflexes preserved.
Dexmedetomidine	0.01 to 0.08mg/kg	IV, IM	Dose dependant	Profound drop in heart rate. Reversed with equal volume of Atipamezole
Pentobarbital	20 to 30 mg/kg	IV	30-45 minutes	Long acting. Apnea may result, observe respiration following administration.

Drug	Dose	Route	Duration of Effect	Notes
Pentothal	8-12mg/kg	IV, slowly	15 minutes	Breath holding. Give IV to effect.
Propofol	2 to 8mg/kg (dose to effect) 0.2 to 0.4 mg/kg/min for IV infusion	IV, slowly	Until discontinued	May cause breath holding.

5.5. Endotracheal intubation:

- 5.5.1. Placement of an endotracheal tube is recommended for delivery of isoflurane anesthesia.
- 5.5.2. Cuffed endotracheal tubes are preferred as they reduce the possibility of aspiration of saliva or stomach contents.
- 5.5.3. Intubation:
 - 5.5.3.1. Lubricate endotracheal tube with sterile lubricant.
 - 5.5.3.2. With the animal in sternal recumbency, extend the neck and head so that they are in a straight line.
 - 5.5.3.3. While holding the upper jaw, pull the tongue forward and down so that the epiglottis is visible.
 - 5.5.3.4. Use the laryngoscope to disengage the epiglottis from the soft palate, exposing the glottis and vocal chords.
 - 5.5.3.5. Spray the laryngeal folds with 2% xylocaine to help decrease laryngospasm (spasmodic closing and opening of the glottis). Insert the endotracheal tube gently past the vocal folds into the trachea (this can be timed with exhalation).
 - 5.5.3.6. Confirm proper placement by checking for the animal's breath as it exits the endotracheal tube during exhalation.
 - 5.5.3.7. Secure the endotracheal tube by tying a piece of gauze around the tube then behind the animal's head.
 - 5.5.3.8. Inflate the cuff of the endotracheal tube.
 - 5.5.3.9. Verify adequate ventilation of both lungs by auscultation.

5.6. Isoflurane anesthesia:

- 5.6.1. Induction (only if injectable anesthetics cannot be used; the animal needs to be premedicated to reduce stress of induction):
 - 5.6.1.1. Use a tight-fitting mask.
 - 5.6.1.2. Adjust the oxygen flowmeter to 0.8 to 1.5 L/min.
 - 5.6.1.3. Adjust the isoflurane vaporizer to 3% to 5%.
- 5.6.2. Maintenance:
 - 5.6.2.1. Use the endotracheal tube or mask connected to the Bain circuit or recirculating circuit.
 - 5.6.2.2. Adjust the flowmeter to 0.4 to 0.8 L/min for Bain; adjust to 50ml/kg/min for recirculating systems.
 - 5.6.2.3. Adjust the isoflurane vaporizer to 1.5 to 2.0% (dose to effect).
 - 5.6.2.4. Apply ophthalmic ointment (natural tears) to both eyes to prevent dryness and damage to the cornea.
- 5.6.3. Recovery:
 - 5.6.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen for 2 to 5 minutes or longer if oxygen saturation levels are low.

5.6.3.2. Remove the endotracheal tube as soon as the animal shows signs of impending arousal, i.e., when reflexes begin to return.

5.7. Sevoflurane anesthesia:

5.7.1. Induction (if injectable anesthetics not previously administered):

5.7.1.1. Use a tight-fitting mask.

5.7.1.2. Adjust the oxygen flowmeter to 0.8 to 1.5 L/min.

5.7.1.3. Adjust the isoflurane vaporizer to 5% to 8%

5.7.2. Maintenance:

5.7.2.1. Use the endotracheal tube or mask connected to the Bain circuit.

5.7.2.2. Adjust the flowmeter to 0.8 to 1.5 L/min.

5.7.2.3. Adjust the isoflurane vaporizer to 1.0 to 3.0% (dose to effect).

5.7.2.4. Apply ophthalmic ointment (natural tears) to both eyes to prevent dryness and damage to the cornea.

5.7.3. Recovery:

5.7.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen for 2 to 5 minutes or longer if oxygen saturation levels are low.

5.7.3.2. Remove the endotracheal tube as soon as the animal shows signs of impending arousal, i.e., when reflexes begin to return.

SOP REVISION HISTORY

DATE	PREVIOUS VERSION	NEW VERSION
2016.03.16	5.4 Pentothal and Propofol, Route of administration: IV	5.4 Pentothal and Propofol, Route of administration: IV slowly
2016.03.16	5.6.2.3. Adjust the isoflurane vaporizer to 1.5 to 2.0%.	5.6.2.3 Adjust the isoflurane vaporizer to 1.5 to 2.0% (dose to effect).
2016.03.16	5.6.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen.	5.6.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen for 2 to 5 minutes or longer if oxygen saturation levels are low.
2016.03.16	5.6.3.2 Remove the endotracheal tube as soon as the animal shows signs of impending arousal.	5.6.3.2 Remove the endotracheal tube as soon as the animal shows signs of impending arousal, i.e., when reflexes begin to return.
2016.03.16	5.7 (NO TEXT)	5.7 Sevoflurane anesthesia: 5.7.1. Induction (if injectable anesthetics not previously administered): 5.7.1.1. Use a tight-fitting mask. 5.7.1.2. Adjust the oxygen flowmeter to 0.8 to 1.5 L/min. 5.7.1.3. Adjust the isoflurane vaporizer to 5% to 8% 5.7.2. Maintenance: 5.7.2.1. Use the endotracheal tube or mask connected to the Bain circuit. 5.7.2.2. Adjust the flowmeter to 0.8 to 1.5 L/min. 5.7.2.3. Adjust the isoflurane vaporizer to 1.0 to 3.0% (dose to effect). 5.7.2.4. Apply ophthalmic ointment (natural tears) to both eyes to prevent dryness and damage to the cornea. 5.7.3. Recovery: 5.7.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen for 2 to 5 minutes or longer if oxygen saturation levels are low. 5.7.3.2. Remove the endotracheal tube as soon as the animal shows signs of impending arousal, i.e., when reflexes begin to return.