



Cornell University Cornell Center for Animal Resources and Education

CARE103.01 Rabbit Anesthesia

The intent of this standard operating procedure (SOP) is to describe proper anesthetic technique for rabbits. This SOP is intended for use by investigator staff and CARE veterinary personnel. This SOP is approved by the Cornell Institutional Animal Care and Use Committee (IACUC) and the Cornell Center for Animal Resources and Education (CARE). Any exemption must be approved by the IACUC prior to its application.

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1. Introduction

This SOP presents anesthetic considerations and protocol options commonly encountered with rabbits.

2. Materials

- Gas anesthesia machine
- Anesthesia monitoring devices
- Endotracheal tubes
- Laryngoscope
- Plain gauze roll
- Gauze squares
- Sterile eye lubricant
- Lidocaine lubricant
- Long cotton swab
- Sterile 0.9% saline or Lactated Ringer's Solution (LRS)
- Intra-venous drip set (pediatric 60 drip/ml)
- Intra-venous catheter and cap
- Bandage tape
- Disinfectant scrub (ex: Nolvasan)
- Needles and syringes
- Anesthesia/analgesia drugs – see appendix 1-3

Note: Check the expiration dates on all drugs; do not use any drugs past the expiration date.

3 Procedures

- a. Consider factors that can affect the choice of anesthetics. These include:
 - i. Breed, age, health status, concurrent medication, and demeanor/disposition of patient.
 - ii. Length and type of operation or procedure to be performed.
 - iii. Possible effect of the anesthesia on the scientific objectives of the study.
 - iv. Special facilities and equipment required (e.g., volatile anesthetics).
 - v. Personal knowledge, experience, preference and skill with available agents.
- b. Perform a pre-anesthetic evaluation of the rabbit and obtain an accurate weight.
- c. Fast rabbits for 1–6 hours prior to anesthesia.
- d. Premedication: administer per Appendix 1, 0-5 minutes before induction if given IV and 10-20 minutes before induction if given SQ or IM. **An analgesic must be administered preoperatively for procedures that may result in pain.**
 - i. Intravenous injection locations:
 - Cephalic vein
 - Lateral saphenous vein
 - ii. Intramuscular injection locations:
 - Cranial thigh (quadriceps)
 - Lumbar spinal epaxial muscles
 - Caudal thigh muscles (point the needle posteriorly)

NOTE: Sciatic nerve damage can occur if the needle is pointed medially or cranially for a caudal thigh muscle injection. Avoid injecting into areas of pathology or surgical implants.
 - iii. Subcutaneous injections: administer subcutaneous injections in the interscapular region, the lateral thoracic, or lumbar dorsal region.
- e. Place an intravenous catheter to maintain venous access and administration of intravenous fluids.
 - i. Shave or pluck and aseptically prepare the catheter site
 - ii. Cannulate and secure IV catheter in one of the following locations:
 - For peripheral vein access, use the auricular vein.
 - If central vein access is required, place a jugular catheter.
 - iii. Administer 0.9% saline or Lactated Ringer's Solution at an average rate of 10 mL/kg/hour.
- f. Injectable anesthesia: see Appendix 2
 - i. Can be used alone for short, non-invasive procedures.
 - ii. Used for induction prior to intubation and the use of inhalant anesthesia.
- g. Use inhalant anesthetics for induction and/or maintenance of anesthesia.
 - i. Use a tight-fitting mask or induction chamber for inhalant induction of the patient.
 - ii. Following sedation by injectable anesthetics or inhalant agents, place an endotracheal tube to maintain a level plane of anesthesia.
- h. Endotracheal intubation

- i. Have appropriate sized endotracheal tubes ready (2.0–3.5 mm). Uncuffed tubes are preferred.
- ii. Open the mouth and pull the tongue forward into the diastema. Advance the laryngoscope from the diastema on the other side of the mouth until the epiglottis and soft palate are visualized. Use the introducer to reposition the epiglottis in front to the soft palate if necessary.
- iii. Spray the larynx with local anesthetic or dab larynx with lidocaine gel by using a long cotton-tip applicator.
- iv. Use the laryngoscope to guide the tube into the trachea
- v. Condensation on the inside of the tube, during expiration indicates correct placement.
- vi. Secure endotracheal tube by tying roll gauze around the tube and then behind the animal's head.
- vii. Hook up the endotracheal tube to the gas anesthesia machine and start the oxygen (400-800mL/min) and gas anesthesia (1.5-2.0%).
- i. Maintenance of Anesthesia:
 - i. Keep rabbit warm by providing a heat source that will not burn throughout the duration of the anesthesia and until the rabbit has fully recovered from anesthesia.
 - ii. Use monitoring devices to assess vital signs and anesthetic depth (ex: pulse oximetry, blood pressure, EKG, thermometer).
 - iii. Never leave the rabbit unattended while anesthetized.
- j Recovery:
 - i. Turn off gas anesthetic vaporizer but keep oxygen running for 5 minutes.
 - ii. Remove endotracheal tube when the rabbit begins to swallow.
 - iii. Observe rabbit during recovery until fully awake.
- k. Postoperative Care
 - iv. Provide 24 hours of quiet recovery time in a warm, dry area.
 - v. Supply food as soon as fully awake to promote gastrointestinal motility and prevent stasis. Use metoclopramide, fluids and force-feeding as needed if stasis occurs.

4. Safety

- Use only anesthetic machine with valid certificate (<12 months).
- Avoid vapors from volatile drugs such as anesthetics, by proper use of scavenging equipment. Refer to [CARE SOP 712: Waste Anesthetic Gas Scavenging Systems](#).
- Attend Waste Anesthetic Gas (WAGS) training given by EH&S.
- Monitor the use of chemical agents and assure that product safety recommendations are followed to protect the health and welfare of the humans and animals that are exposed to the agents.
- Drugs that come under the control of the Drug Enforcement Agency (DEA) must be stored in a double-locked cabinet in a secure area.

5. Contingencies

- Contact Cornell Environmental Health and Safety at <http://www.ehs.cornell.edu> or 255-8200 for concerns regarding the use of chemical agents and monitoring of waste anesthetics gas.

- Contact CARE at 1-800-349-2456 or care@cornell.edu for concerns regarding the use of particular anesthetic regimes or additional training.

6. References

- CARE SOP 712: [Waste Anesthetic Gas Scavenging Systems](http://www.research.cornell.edu/care/documents/SOPs/CARE712.pdf)
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7. Appendices – See the following pages

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Appendix 1. Table of Rabbit Tranquilizers, Sedatives and Other Agents

Drug	Dose/Route	Duration of Effect	Notes
Glycopyrrolate	0.01–0.1 mg/kg SC, IM, IV	60 minutes	Reduced bronchial and salivary secretions, inhibition of vagal responses. Elevated heart rate may result
Acepromazine	0.25–1.0 mg/kg SC, IM, IV	4 hours	Moderate sedative, peripheral vasodilation, no analgesia.
Acepromazine + Butorphanol	0.5 mg/kg + 0.5 mg/kg SC, IM		Sedation, can be mixed in same syringe
Epinephrine (Adrenaline)	20 µg/kg SC, IV		For cardiac arrest. Can be given into trachea.
Diazepam	0.5–5 mg/kg SC, IV, IM	30–180 minutes	Sedative No analgesia
Doxapram	5 mg/kg IM, IV	15 minutes	Respiratory stimulant
Fluid Therapy	10–20 mL/kg/h IV 10–15 mL/kg/h SC		Warm before use
Xylazine	1–5 mg/kg IM, IV	30–60 minutes	Sedative, analgesic, muscle relaxant. Avoid in sick or debilitated animals, reverse with Yohimbine.
Detomidine	150 µg/kg IM		Tranquilization, not recommended. May cause anorexia, myocardial necrosis.

Appendix 1. (Continued)

Drug	Dose/Route	Duration of Effect	Notes
Medetomidine	0.1–0.5 mg/kg IM, IV		Sedative, analgesic. Immobilized at higher doses. Can cause bradycardia and respiratory depression. Reverse with equal volume atipamazole.
Metoclopramide	0.5 mg/kg SC, IM	8-12 hours	GI motility stimulant for post-operative stasis
Midazolam	0.5–5 mg/kg IM, IV	<2 hours	Sedation
Ketamine	10–15 mg/kg IM, IV	IM: 1 hour IV: 15-20 min.	Sedation
Butorphanol	0.1–0.5 mg/kg q4h	2–4 hours	Analgesic
Buprenorphine	0.01–0.05 mg/kg IM, IV, SC q6-12h	6–12 hours	Moderate analgesia
Morphine	1–5 mg/kg IM, SC q4h	2–4 hours	Analgesia
Meperidine	5–10 mg/kg IM, SC q2–4h	2–3 hours	
Oxymorphone	0.05-0.2 mg/kg IM, IV, SC q 8-12h		Analgesia
Fentanyl/droperidol	0.22 mL/kg IM	20–40 minutes anesthetic time 1–4 hours sleep time	Sedation analgesia Premedication anesthesia
Carprofen	4 mg/kg IM, SC q24h 1.5 PO q12h	24 hours	Moderate analgesia
Flunixin	0.5–2 IM, SC	12–24 hours	Analgesia
Ketoprofen	3 mg/kg IM, SC q24h	12–24 hours	Analgesia
Meloxicam	0.2 mg/kg IM, SC 0.3 PO q24h		Analgesia
Yohimbine	0.5–1.0 mg/kg depending on dose of medetomidine administered		Xylazine reversal agent.
Atipamazole	1 mg/kg IM, SC, IV		Medetomidine reversal agent

Appendix 2. Rabbit Injectable Anesthetics and Combinations

Anesthetic	Dose and Route	Duration of Effect	Notes
Ketamine	15–30 mg/kg IM		Immobilization
Ketamine-acepromazine	15–30 mg/kg Ketamine + 0.2 mg/kg acepromazine IM, IV	10 minutes	Surgical anesthesia
Ketamine-xylazine	35 mg/kg ketamine + 5 mg/kg xylazine IM, IV		Surgical anesthesia
Ketamine-diazepam	10–20 mg/kg ketamine + 0.5 mg/kg diazepam IV, IM	20–30 minutes anesthesia 1–2 hours sleep	Surgical anesthesia
Tiletamine/zolazepam	5–25 mg/kg IM, IV	20–30 minutes	Light-medium planes of anesthesia, dissociative. Reported to cause renal necrosis in New Zealand White Rabbits
Propofol	3–10 mg/kg IV	Until discontinued	Induction agent
Ketamine-medetomidine	25 mg/kg ketamine + 0.5 mg/kg medetomidine IM		Anesthesia
Medetomidine + Ketamine + Butorphanol	0.2 mg/kg + 10 mg/kg + 0.05 mg/kg SC	30–40 minutes anesthesia 1–4 hr sleep	Induction Can be mixed in same syringe
Ketamine + xylazine + butorphanol	35 mg/kg ketamine + 5 mg/kg xylazine + 0.2 mg/kg butorphanol IM		Anesthesia
Ketamine/midazolam	15–30 mg/kg ketamine + 2-5 mg/kg midazolam IM	20 minutes	Surgical anesthesia.
Fentanyl/medetomidine	0.008 mg/kg fentanyl + 0.33 mg/kg medetomidine IV		Anesthesia

Appendix 3. Rabbit Inhalation Anesthetics

Drug	Dose and Route	Duration of Effect	Notes
Isoflurane	5% induction 1%–3% maintenance	Until discontinued	Inhalant anesthetic
Sevoflurane	6%–8% induction 3%–6% maintenance	Until discontinued	Inhalant anesthetic
Halothane	5% induction 2%–3% maintenance	Until discontinued	Inhalant anesthetic
Nitrous Oxide	1:1 mixture nitrous oxide to oxygen as an adjunct to other volatile agents	Until discontinued	Can diffuse into the cecum and cause distension

Appendix 4. Example of an Anesthesia Protocol for Laparotomy (i.e., spay)

Preanesthetic/Induction

Drug	Dose/Route	Duration of Effect	Notes
EMLA cream	Topically over venipuncture site for 30 minutes		Topical local anesthetic
Medetomidine + Butorphanol + Ketamine	0.2 mg/kg 1 mg/kg 10 mg/kg		Mix all in same syringe and administer IM

Intubate

Administer fluids IV at a rate of 10 mL/kg/hour

Maintenance

Drug	Dose/Route	Duration of Effect	Notes
Isoflurane	1.5%–3%	Until discontinued	Inhalant anesthetic

Appendix 4. (Continued)

Post-Operative

Drug	Dose/Route	Duration of Effect	Notes
Carprofen	4 mg/kg SC	24 hours	Moderate analgesia

Appendix 5: Example of an Anesthesia Protocol for Exsanguination

Drug	Dose/Route	Notes
Acepromazine 10 mg/mL	10 mg IM	Mix acepromazine and ketamine in same syringe
Ketamine 100 mg/mL	100 mg IM	

After injection, wait 6–10 minutes until rabbit is anesthetized to begin procedure.