Rabbit Anaesthesia ASAP Webinar 2014

Dr Narelle Walter

Melbourne Rabbit Clinic

Rabbit anaesthetics are often considered challenging and have the reputation for being unsuccessful and difficult.   The success of a rabbit anaesthetic rests more on planning, monitoring and additional supportive treatments than the choice of drugs with the exception of analgesia.

A comparative study undertaken in 2008 in the UK involving 7652 'healthy' rabbit anaesthetics showed a death rate of 0.73%. In the same study 557 'sick' rabbit anaesthetics showed a 7.37% risk of death (Overall 1.39%). The anesthetic death risk is higher in rabbits compared to healthy dogs (0.05% ie 1 in 1849) and cats (0.11% ie 1 in 895) (Brodbelt et al, 2008).

Contents page:

Prior to surgery

A complete and thorough examination is required to fully assess a rabbit's suitability for an anaesthetic. Often the success of an anaesthetic recovery starts days before the actual procedure.

Pre-anaesthetic examination should include

- **Diet discussion.** Rabbits on high carbohydrate, low fiber diet have longer and more complicated recoveries in the days after the surgery and are more prone to post-operative illeus. Dietary change for at least 4-6 weeks may be required prior to routine procedures
- **Weight assessment.** For any non-urgent surgeries it is ideal to ensure that the bunny is not overweight and is on a hay and greens diet for at least 3-4 weeks. This is a very important part of anesthetic recovery.
- **Thorough pre surgical examination and discussion.** Rabbits commonly have subclinical disease that may not be apparent to owners. Owners may also have noted a small change in behavior ('not quite right') and assumed that routine procedures (grooming, desexing) may be the resolution. Commonly subclinical disease/conditions can be dental disease, renal disease, respiratory infection and uterine disease.

Obviously in emergency situations this may not be possible.

On the day

Rabbits and guinea pigs should not be fasted prior to surgery. This may increase stress and compromise the anaesthetic and delay recovery. Removal of food for 1-2 hours prior to pre medication may assist with removing food stuffs from the mouth.

For any hospitalized rabbit ask the owners to bring in a 'lunch box'. This should contain greens, a small treat and hay if your clinic does not routinely have any. Encouraging owners to provide specific foods helps to minimise changes to the type of foods offered to individual rabbits. This familiarity will help to discourage inappetence post-surgery.

If the rabbit is bonded to another rabbit or to a stuffed toy this should also be brought in for the day. These companions will help minimize stress, provide moral support and help with medical and surgical recoveries.

Instruct owners that housing inside is essential for 3-5 days after any anaesthetic. This not only helps to regulate environmental temperatures but allows close monitoring from owners to ensure eating and defecating. Ideally close care from owners over the recovery period of 24-72 hours dependant on surgical procedure.

Rabbits at the Clinic

Rabbits are prey animals and, understandably, they do not like leaving their safe home environment or any major changes; they are creatures of habit.

If possible, when a rabbit comes to the clinic, show them to a spare room away from scary, noisy cats and dogs in the waiting room, or at least guide them to the other side of the room.

This is also the case when housed in hospital.

- Place rabbits away from cats and dogs, preferably in another room and away from the traffic of the hospital.
- Always provide hay, or ask the owner to bring in their normal diet, and a place for them to hide in (eg cardboard box. Note: entire female rabbits may 'nest guard' in this environment).
- Provide a non-slip surface in caging (towels)
- House lower the waist height (facilitates capture in fractious rabbits)
- Minimizing stress plays a big part in recovery of any rabbit illness and the success of an anesthetic

Rabbits should be supplied with their normal mode of drinking eg bowl compared to dripper bottle. Some rabbits will not use an alternative if they are not used to it and this may contribute to dehydration.

Pre surgical examination

It is important to realize that many low grade concerns can indicate a severe underlying illness. It is often best to reassess the animal's safety for an anaesthetic as survival and surgical recovery can be compromised.

	Heart Rate	*Respiration Rate*	*Temperature*	*Gut Sounds*
Rabbits	130- 320 bpm	32- 60 bpm	*38.5-40 C*	*1 per20-30 secs*
Guinea Pigs	*230-380 bpm*	*42-100*	*37.2-39.2 C*	*1 per 40-60 secs*

Many conditions may be noted on a routine pre-surgical examination that should be investigated or resolved prior to an anaesthetic. Often asking owners specific queries may help to confirm the absence of any underlying conditions. Many owners are often unaware of the underlying nature of rabbit's subclinical disease and a mild change in behaviour may prompt owners to present for routine procedures

	Observation	*Possible condition*
Condition	*Underweight or sudden weight loss*	*Dental, Renal disease, intestinal parasites etc*
Question for Owners	*Have we lost weight recently? Has the weight loss been intentional?*	
Condition	*Moist dermatitis around mouth*	*Dental disease*
Question for Owners	*Any eating habit changes recently? Change in choices? Slower eating?*	
Condition	*Discharge from eyes/nose or found on inside of front paws*	*Low grade Upper Respiratory Disease, Dacrocytitis. These are often found in conjunction with a serious underlying illness*
Question for Owners	*Any sneezing, coughing or breathing faster (this is often observed during hospital pre anesthetic observation)*	
Condition	*Overweight or inappropriate diet*	*Inappropriate diet predispose to gut stasis and poor anesthetic and surgical recovery*
Question for Owners	*Ask owners to list diet types and amounts*	
Condition	*Sunken eyes or half closed eyes*	*Dehydration, renal disease*
Question for Owners	*Activity level normal? Are we lazier then normal?*	
Condition	*Dental changes**	*Dental disease,*
Question for Owners	*Any changes to diet preferences, unexplained weight loss or companion gaining weight?*	
Condition	*Scruffy coat*	*Vit C deficiency (guinea pigs), poor grooming (dental disease/ poor mobility/cardiac disease/renal disease)*
Question for Owners	*Any excessive moulting? Change in grooming habits, faecal staining?*	

**A dental examination should be included in any pre-surgical examination. This can be undertaken in the awake patient with a large otoscope cone. It should be noted that a negative finding cannot be ruled out unless a full oral exam under an anesthetic (a diagnostic dilemma) has been performed.*

During the anaesthetic

Anesthetising the rabbit is a very time consuming task. Prior to the anaesthetic every effort should be made to limit interruptions from staff enquiries to obtaining forgotten equipment. If further equipment is required it is best to alert another staff member to ensure that the animal is not left unattended.

Note: the surgeon cannot monitor or alter the depth of anesthetic significantly, to prevent intra surgical recoveries it is best for a nurse to remain with the animal at all times.

- Never leave the rabbit alone even when anaesthetized
- Use every monitoring device you have
- But always listen to heart rate and respiratory rate.
- Fluids. IV is ideal but subcutaneous if a catheter has not been placed.
- Ventilate, even if masked. A high oxygen rate is required.
- Never place an E- collar on a rabbit as they are unable to eat their caecotrophs and this increases post operative stress.
- Subcuticular skin sutures or the (minimal) use of tissue glue will prevent chewing.
- Maintain body temperature- Keep warm!
    - Minimal clipping and minimal alcohol scrub in the surgery prep.
    - Heat should be provided pre- and post-surgery
    - Caution with heat bags, if over-heated causes thermal burns
    - Caution with heat mats in the conscious animal (chewing)

Positioning of the anesthetised rabbit

Due to the small chest cavity and large abdominal content it is important to minimise pressure on the diaphragm. Always position rabbits on a slight angle.

Care should be taken with the weight of tubing, especially if an ET tube is placed. Connective tubing can easily disturb an ET tube placement. Sandbags, tape or D-grip (Mr Squiggle) can minimise the tube weight and facilitate a stress free anaesthetic.

Heat Therapy in Rabbits

Rectal Temperatures of less than 36.6°C in rabbits are considered hypothermic and can compromise anaesthetic recovery.

Temperatures of less than 37.8 cause adrenergic receptors to become refractory to catecholamines. This can then contribute to bradycardia and hypotension by impairing vasoconstriction compensation pathways.

Rabbits present in shock with hypothermia, bradycardia and hypotension. Active warming is, along with fluid resuscitation a main treatment in resuscitation of the shock/collapsed rabbit

It should be noted that active warming should be delayed in shock patients until fluid resuscitation is achieved (Blood pressure >40 mmHg). Active warming can cause peripheral capillary dilation and further aggravate hypotension.

There are many heating options available

- Heat Lamps
- Heating Pads

Care should be taken with heat lamps and heating pads as rabbit's skin is thin and can burn easily.

- Hot water bottles/heated fluid bags/warm water filled gloves. Fluid bags can be heated in warming cupboards. They can also be heated in the microwave. Caution should be undertaken as uneven heat may result with 'hot spots' that can burn skin. Fluid bags can be colored with dyes to indicate heating bags so they are not inadvertently used for intravenous fluids.
- Warm towels and insulating wrapping (eg bubble wrap, aluminium foil). Towels can be warmed in a clothes dryer or warming cupboard
- Humidicribs/incubators. There are many on the market from second hand humidicribs to avian incubators. Environmental temperature should be set on 27-28 degrees.
- Warmed intravenous fluids. Commercial warmers are affective, as is placing the fluid line through heated fluid bags (these are required to be changed often.) The small volume of fluid required in rabbits often means the intravenous fluid warming device needs to be placed close to the patient.
- Circulating Warm water beds
- Forced warm air blowers. Forced warm air blowers are a distinct advantage when attempting active patient warming as they not only provide protection against further radiant heat loss but increase body temperature. They are thought to be the ideal active warming heat source. A judiciously used hair dryer can also be used as an alternative.

Always monitor rectal temperature every 15 mins during active warming to prevent hyperthermia. Once a rabbit's temperature reaches 37.8°C (100°F), active warming should be stopped and rectal temperature monitored to prevent overheating.

Fluid therapy

Post surgical anorexic or at the least a decrease in fluid intake is common in rabbits. Rabbits compensate for mild circulatory dehydration by reabsorbing water from the digestive tract, resulting in reduced gut motility and the potential for gastric blockages. This often means that rabbits do not show the classic signs of dehydration as other species.

Intra and post operative fluid therapy, is essential in rabbits and will encourage continued gut movement and improve recovery.

Fluid product	Indication	Route of admin..	Notes
0.9%NaCl	Mild dehydration <5% With whole blood transfusion	SC, or IV	Isotonic SC 20-35ml/kg q4-24hr
Hartmanns	Moderate – severe dehydration	IV	Isotonic Maintenance rate 4ml/kg/hr Surgical rate 10ml/kg/hr Shock rate 60ml/hr for less than 30mins
Plasmalyte 148	Moderate- severe dehydration Useful for rabbits with acidosis or hypercalcaemia	SC, or IV	Nonpyrogenic isotonic. Rates : same as above Does not have calcium or lactate and instead magnesium, acetate and gluconate.
Voluven 6%	Hypoproteinemia Hypovolemia Hypotension Shock	Slow IV	Colloid 3ml/kg can be repeated over 15minutes (maximum 3- 4 boluses)
50% Dextrose	Hypoglycaemia	IV	**0.25ml/kg as a 1:1 dilution with 0.9%NaCl bolus.** Repeat blood glucose test in 1 hour after. For persisting hypoglycaemia, continue CRI of 1.25% Dextrose in crystalloids while rechecking blood glucose every 2-3 hours. Be conservative with parenteral use of dextrose as it may induce compartmental shifts in electrolytes and water, which ultimately lead to further hypovolemia.
Whole Blood Transfusion	Anaemia Acute blood loss with PCV < 20% Chronic blood loss with PCV < 15%	IV	**Start transfusion at 0.5 to 1.0mls/kg/hr for first 15- 30 minutes** and if no evidence of transfusion reaction **increase to 6-12mls/kg/hr** (or as required to complete appropriate transfusion volume within 4 hours). In an emergency can go as high as 20-25ml/kg/hr.

A quick reference guide to monitoring anaesthesia

	Heart Rate	*Respiration Rate*	*Surgical Heart Rate*	*Surgical Respiration Rate*	*Temperature*	*Blood Pressure*
Rabbits	130- 320 bpm	32- 60 bpm	*200-280* <200 concerning*	*30-60 (Tidal Volume is 4-6 mls/kg)*	*38.5-40 <37 hypothermic*	*90-130 mmHg*
Guinea Pigs	*230-380 bpm*	*42-100*	*180-280*	*40-60*	*37.2-39.2 C*	*80-90 mmHg*

**Lower surgical heart rates of 120-160 can be seen with Domitor usage.*

Anaesthetic Tips

- Pulse oximeters can be placed/Pulse can be palpated
  - Ear
  - Tongue
  - Genital area
  - Foot (small rabbits and guinea pigs)
- Blood pressure monitoring placement as per cats.
- O2 flow rates: High flow rates of 2-4% are required.
- Isoflurane: Slow increments (2-4 minutes) from 0.5% for induction maintenance at 2-4 %.

Note: Isoflurane alone is not ideal and predispose to stress and complications

Ideally lower isoflurane levels with pre-medication/analgesia/induction medications

- SpO2 >95% (90-92% = hypoxia), TE CO2 35-45 mmHg.
- Anaesthetic depth
  - Loss of corneal reflex indicates a dangerous depth of anaesthesia in rabbits unless Domitor is used.
  - Palpebral reflex is not reliable.
  - The Toe pinch, leg withdrawal reflex is the most reliable.
  - Rate, depth and pattern of respiration are also reliable indicators.
- **Hypothermia is important and prolongs recovery**.
- **Analgesia is essential**.
- Angle rabbits on the table to take the weight of viscera off the diaphragm.
- Fluid Replacement: Essential not optional in rabbits and guinea pigs.
  - Surgical fluid rates: 10 mls/kg/hour
  - Subcutaneous rates: 20 mls/kg every 12 hours

Post Operative Care

In hospital

After completion of the surgical procedures rabbits require intensive nursing care and should not be left without nurse's hands on them until they are lifting their head. Unlike other species, unattended recovery predisposes to complications.

Once removing the anaesthetic gas the nurse should

- Continue with oxygenation at a high flow rate
- Remain with hands on the animal as sudden and explosive recovery may occur (jumping off the table)
- Continue with analgesia: short term with CRI, short acting opioids and medium term (NSAIDS)
- Continue with fluid replacement intravenous and subcutaneous
- Continue with active warming (Baer hugger, hair dryer)

The nurse should remain with the animal until it is lifting its head. This is often 10-20 mins.

After this the rabbit or guinea pig should

- Be placed in a heated cage or humidicrib till completely recovered
- Be offered food
- Be syringe fed if not eating in 2-3 hours
- Should be checked every 10 mins

At home

Home care is an essential part of the surgical treatment and should be stressed to owners. Complications from surgery or pre-existing conditions may cause concerns and affect long term recovery or survival up to 1-2 weeks after surgery (or longer is some cases.)

Owners should always be requested to remain home the day after surgery to ensure the rabbit or guinea pig is eating and recovering well. Alternatively, day stays in the veterinary clinic may help to monitor their progress.

Table of Anaesthetic Complications

Stage of surgery:	Possible Complications:	Notes:
Preoperative	Anaesthetic death- highest risk at induction	➢ Always do a general health check before giving a sedative ➢ Monitoring by a good nurse after sedative administration ➢ Know your drugs well, contraindications, adverse effects…
	Apnoea – Bradycardia	➢ Pre-oxygenation before induction ➢ Always attempt endotracheal intubation
Intraoperative	Anaesthetic death	➢ Monitoring by a good nurse required at all times ➢ Minimize surgery time
	Hypothermia	➢ Active warming
	Haemorrhage	➢ Ensure that ligatures are placed securely around blood vessels as recovery can be explosive.
	Hypotension	➢ Blood pressure monitoring, IVFT
Postoperative	Anaesthetic death- high risk at recovery	➢ Monitoring by a good nurse required ➢ Oxygenation, and warming
	Gut stasis	➢ Analgesia important ➢ Encourage patient to eat as soon as possible ➢ Supportive care: gut prokinetic, fluid therapy, critical care syringe feeding ➢ Avoid use of Elizabethan collar
	Hepatic lipidosis especially in anorexic obese patients	➢ Don’t fast ➢ weight management prior to surgery
	Wound breakdown/infection Seroma formation	➢ Internal stitches- SC or intradermal, that are not placed too tight ➢ Analgesia important ➢ Keep bedding clean ➢ Guinea pigs require 1 week antibiotics post operative
	Infections: - intra-abdominal abscesses - Peritonitis	➢ Sterile technique important ➢ Commonly involving uterine stump or ovarian pedicle stump ➢ Care not to puncture gastrointestinal tract
	Intra- abdominal adhesions	➢ Use powder free gloves ➢ Monofilament absorbable suture material on a swaged needle ➢ Minimal handling of the gastrointestinal tract

Anaesthetic Drugs

Sedative/ Premedication Drugs	Notes
Glycopyrrolate 0.02mg/kg SC. 10 mins post: Ketamine 5mg/kg IM in a combination syringe with Fentanyl 15-25 micrograms per kg (0.015-0.020mg/kg)	*Variable sedation and some Ketamine hyper excitement can be seen on lower Fentanyl doses.*
Glycopyrrolate 0.02 mg/kg SC 10 mins post: Fentanyl 50 micrograms per kg (0.05mg/kg)	*Decrease by 50% for rabbits less than 1 kg and debilitated or old rabbits*
Buprenorphine 0.01-0.05 mg/kg	*Mild Sedation, good analgesia*
Acepromazine 0.5 mg/kg	*Can combine with Buprenorphine*
Midazolam 1mg/kg combination with Buprenorphine 0.05 mg/kg	*Midazolam can also be used by itself*
Ketamine (5–15 mg/kg IM, SC) Midazolam (1 mg/kg IM)	*Diazepam (1-2 mg/kg) can be substituted for midazolam.*
Ketamine (5–15 mg/kg IM, SC) Medetomidine (150 µg/kg IM, SC)	
Medetomidine 0.05 mg/kg Ketamine 8 mg/kg (can increase to 10 mg/kg) Buprenorphine 0.05 mg/kg Antisedan dose is half that of Domitor dose.	*Mix in same syringe, dilute with sterile flush (ketamine can sting IV) and give 1/3 IV. Remaining can be used as a 'top-up' if required. Can also use as IM but profound sedation and slow recovery. A repeat dose of Temgesic (dose 0.025 mg/kg) can be given intra op if extra pain relief required. Buprenorphine can be substituted for Butorphanol (0.25 mg/kg). This gives greater sedation but minimal pain control.*
Induction Agents Can be administered to increase initial anesthetic depth if required.	
Propofol (5-14 mg/kg)	*Transient apnoea occurs, intubation essential. Doses of 15-20 mg/kg have been known to cause respiratory arrest.*
Midazolam (0.1-1 mg/kg)	
Alfaxan	*Personal experience: poor recovery and respiratory depression. For use with intubated animals only.*
Isoflurane	*See previous notes*

Note: The MRC have not used all these drug combinations and some doses are anecdotal, the responsibility for the use of these products lies with the prescribing veterinarian

Analgesia

Intra operative	
Buprenorphine 0.03mg/kg IV	Infusion at 10–20 mcg/kg/minute. A CRI of 2–10 mcg/kg/minute should be used post-op. (Plumbs)
Fentanyl/Ketamine	
(Loading ketamine dose of 0.5 mg/kg IV)	
At surgical incision site	
Lignocaine 1mg/kg SC or topical	Lignocaine (onset 5 minutes, duration approx 60-90 mins)
Bupivacaine 1mg/kg SC or topical	Bupivicaine (onset 20 minutes, duration approx 4-8 hours)
Post operative	
Metacam 0.3-0.5mg/kg SC q24hr	Ensure good hydration with concurrent use of NSAID
Buprenorphine 0.05mg/kg SC q 8hr.	Buprenorphine reverses the sedative and respiratory depressive effects of fentanyl
Tramadol 4mg/kg PO q8-12hr	

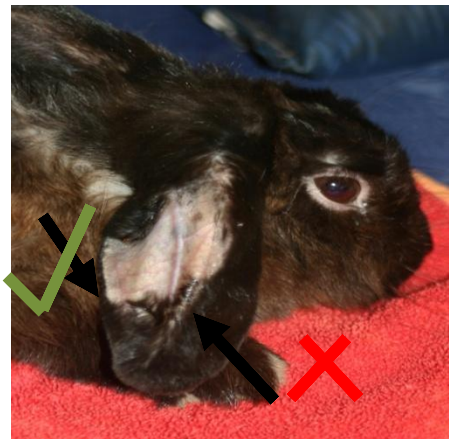
Emergency drugs for rabbits and guinea pigs

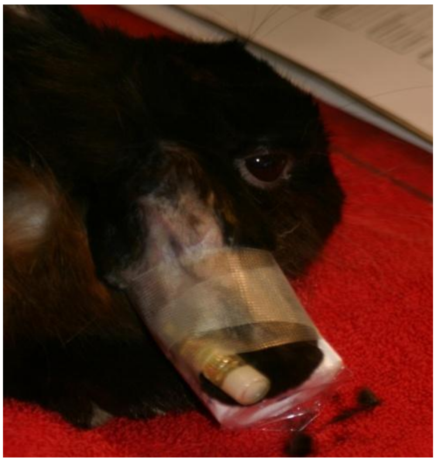
Drug	Dose + route	Action	Indication
Atropine 0.54mg/ml	*0.02mg/kg IV, IM, SC*	*Anticholinergic agent* Its vagolytic effect increases the heart rate *(onset of action 15-30secs)*	- Bradycardia (HR <180bpm) in guinea pigs. *NB Atropine is not recommended in rabbits because 40% possess endogenous atropinesterase and the effective atropine dose is unpredictable.*
Glycopyrrolate 0.28mg/ml	*0.01-0.1mg/kg IV, IM, SC*	*Anticholinergic agent (onset of action 30-45sec)*	*Administer in rabbits immediately when a bradycardia (HR < 180bpm) is detected.*
Adrenaline 0.1mg/ml and 1mg/ml	*0.1-0.1mg/kg IV*	Vasopressor NB Adrenaline loses much of its effectiveness as vasopressors in the hypoxic and acidotic body state.	- Ventricular fibrillation - Asystole - Pulseless electrical activity (PEA)
Glucose 50% dextrose	*1ml/kg IV dilute 1:4 or 1:1 with 0.9%NaCl*		*- If hypoglycemia (<70 mg/dl or 3.9mmol/L) administer 1:4 solution.* *- If also symptomatic with seizures administer 1:1 solution.*
Calcium 100mg/ml	*50mg/kg IV*		Hypocalcaemia
Doxapram 20mg/ml	*2mg/kg IV*	Respiratory stimulant	Respiratory arrest
Vasopressin 20u/ml	*0.8u/kg IV Single dose*	*Nonadrenergic agent that causes pronounced vasoconstriction*	- Acidotic state (followed with adrenaline) - Asystole - Pulseless electrical activity - Other rhythms refractory to adrenaline, defibrillation and atropine
External defibrillation	*2-10J/kg*		
Buprenorphine 0.3mg/ml	*0.03-0.05 mg/kg IV, SC q6-12h*	Opioid	- Pain in the dehydrated patient
Meloxicam	*0.5 mg/kg SC q24h* *0.3 mg/kg PO q24h*	Non steroidal anti-inflammatory	- Pain in the rehydrated patient

<u>How to place a catheter</u>

To place an intravenous catheter in a rabbit they should first have some local anaesthetic gel placed on the skin after clipping for at least 15-20 mins. (check timing)

The caudal margin of the ear is clipped and local anaesthetic applied.





An alcohol swab is used to clean the area and a 25 gauge catheter is placed in the lateral ear vein. It is important not to try and catheterise the central ear vein as the artery sits underneath this vessel and accidental perforation can result in haemotoma, reduced blood flow and sloughing of the ear.

Once a catheter is placed, a rolled bandage is placed under the ear and taped in the usual manner.

It should be noted that placement of a catheter in the cephalic vein or lateral saphenous, are also common techniques but does require in most cases a sedated rabbit. In short eared rabbits such as Netherland Dwarfs these are the veins of choice.

<u>Please see table below for alternative catheter placement</u>

How to take a blood sample.

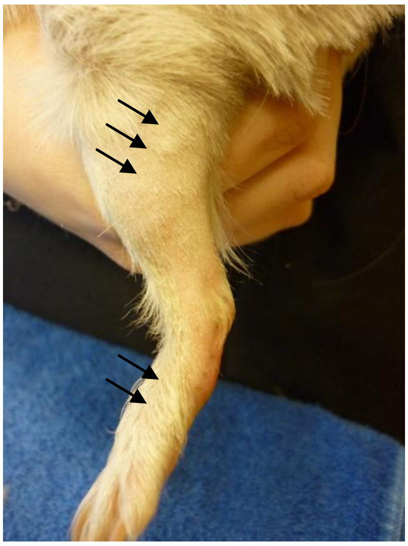
Here at the Melbourne Rabbit Clinic we have found that venous sampling from the lateral saphenous causes the least stress in our rabbits and guinea pigs. It runs over the lateral aspect of the tibia. After clipping this area is is easily visable. Placing a small amount of local gel (xylacaine) over the area initially will assist with sampling.

Placing the animal on a bench covered with a towel, or hold against the body of the handler. Using a portion of this towel or another cover the head and tuck this under your elbow while the forearm places gentle pressure along the spine. The second hand is then placed under the pelvis holding out the hind leg.

The sampler then extends the hind leg to clip over the lateral saphenous and access the vein for blood sampling. It should be noted in most cases, although the handler is positioned to be able to occlude the vessel, it is often not required and can contribute to haematoma development.

A 1 ml syringe is ideal for sampling to reduce increased pressure collapsing the vein when the plunger is retracted. It may be useful in some guinea pigs to place a needle only into the vein and drip into the open sample container

Sample volume in a healthy rabbit/guinea pig can be up to 1% of body weight. In an unwell animal this should be reduced to 0.5%, this, in most rabbits and guinea pigs far exceeds the amount required for blood profile.



Blood sampling in a guinea pig is similar to that in a rabbit with the saphenous preferred. An alternate site to the medial saphenous is over the tarsal bones. Application of local anaesthetic gel greatly facilitates sampling.

Options for blood sampling/catheter placement in rabbits and guinea pigs

	Rabbit	Guinea Pig
Jugular	Requires sedation but is the ideal location for obtaining greater quantities for blood transfusions	Requires deep sedation/anaesthesia. Difficult to visualise due to fat in this area
	Technique: ***Rabbit:*** Suspend animal over table edge with neck extended and legs held down ***Guinea Pig:*** As per rabbits, the handler may further assist with a hand under the chest in this position (extension of legs not often required)	
Auricular Vien /Artery (Central)	Fractious or well animals may require sedation or local anasethetic gel applied. ***Caution for use due to the high risk of thrombosis and sloghing of the ear.*** Ideal area of arterial blood sampling for blood gases. Not easy on dwarf rabbits (small ears)	Challenging, although needle prick can assist with small sampling for glucose measurement
	Technique: ***Rabbit:*** Place the rabbit on a towel with the handler holding the ear horizontal. Clip, place local gel and swab. The sampler should hold the ear bending the tip over the stabilising fingers to enable a very horizontal approach to the vein as it lies just below the skin. ***Guinea Pig:*** As per rabbits although vocalisation is common.	
Cephalic	Difficult to visualise and if the rabbit is not sedated/ill resistants to extension of the foreleg may cause muscle trauma	Possible mainly for catheter placement
	Technique: ***Rabbit:*** As per other animals although sedation/local gel application will increase success ***Guinea Pig:*** as per rabbits	
Lateral Ear Vien	Ideal for catheter placement in most rabbits, small blood volumes make it not ideal for blood sampling	Not possible for all but needle prick sample
	Technique: ***Rabbit:*** Clip caudal margin of ear, place xylacaine gel and swab. 25 gauge catheter can be placed using an obtuse angle. (see further details above) ***Guinea Pig:*** swab area and use small guage needle for a pin prick for glucometer use	
Intra osseous	Often the only options in young severely collapsed rabbits.	Often the only option in collapsed guinea pigs
	Technique: ***Rabbit:*** As per other animals, 18 gauge needles can be used in the proximal femur ***Guinea Pig:*** as per rabbits	
Saphenous	Ideal location for blood sampling.	Ideal location for blood sampling.
	Technique: ***Rabbit:*** As per other animals although sedation/local gel application will increase success ***Guinea Pig:*** as per rabbits	

Intubation in rabbits and guinea pigs

Intubation in the rabbit and guinea pig is a challenging procedure. In the rabbit the opening of the mouth is limited, prominent incisors hamper view, the elongated oral cavity and large tongue large incisor teeth make visualization of the larynx even with a laryngoscope or endoscope difficult.

Intubation of guinea pig poses an even greater challenge than rabbits. The guinea pig stores food in their cheeks which is required to be removed as this will hamper tube placement. The large palatal ostium (soft palate continuation with the tongue base) blocks easy access to the glottis and in most cases endoscopic intubation is the most successful technique.

It is suggested that rabbits and guinea pigs are removed from food for 1-2 hours prior to anaesthetic to decrease food in the oral cavity. As guinea pigs store food in their cheeks, removal of this is required prior to attempting intubation.

Intubation improves with technician experience and should be attempted for all anaesthetics, especially in rabbits. It should be noted though that continuing attempts can not only damage the glottis and impede anaesthetic safety and recovery, but can prolong an urgent anaesthetic. A general guide is no more than two attempts or 5 mins. If unable to intubate after this then the decision to continue on mask only or reschedule surgery should be made.

Blind technique

Below a blind technique is described as it is assumed that this would be the most common technique attempted in an emergency situation. This technique requires the rabbit to be of minimal anaesthetic depth. This allows a cough reflex to be elicited when the ET tube enters the trachea, confirming placement

Notes on ET tubes:

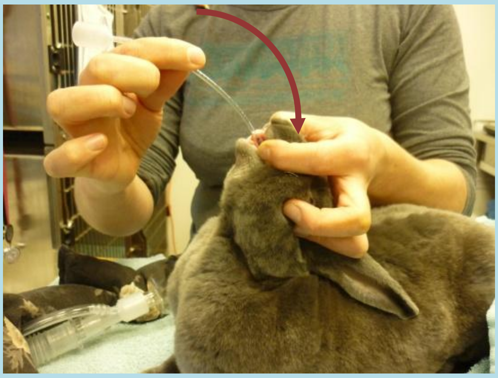
Non cuffed tubes should be used in rabbits and guinea pig to prevent inadvertent damage to the trachea with over inflation of a cuff. Small endotracheal tubes of 1.0- to 2.5-mm internal diameter are needed for intubation of the guinea pig and 1.5-3.5 (2-3 most common) for rabbits. Large intravenous or urinary catheters can be used in guinea pigs (14-16 gauge).

The high flexibility of tubes less then 2mm hamper intubation, a stylet can be placed to enhance rigidity. Care should be taken when using small tubes as occlusion with mucous plugs occurs frequently.

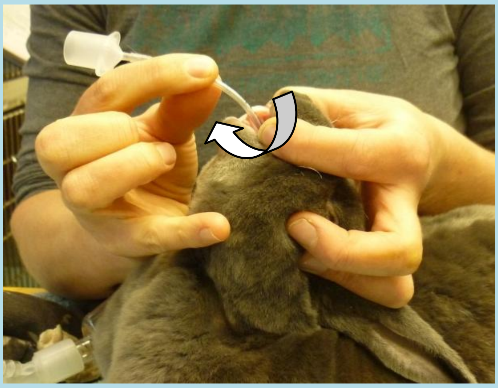
Xylocaine jelly to lubricate the ET tube and prevent laryngeal spasms for intubation, or alternatively lignocaine spray 1-2 minutes before intubation is attempted. (Longley 2008) caution as in the authors experience the force of the spray may cause laryngeal irritation and poor recovery. One drop of a 2% lidocaine solution applied directly to the larynx would be an alternative.

Step by Step ET placement in a rabbit

- Place the rabbit in sternal recumbency providing flow by oxygen with a mask. This allows for anesthetic depth monitoring by accessing tension in the front legs, if required isoflurane can be administered to increase depth to allow for intubation.
- Once adequate depth is obtained the rabbit's head is extended vertical and the tube gently advanced into the oral cavity in a curved pattern



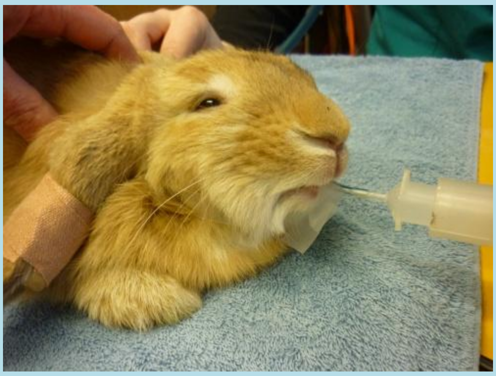
- Resistance is felt when the epiglottis is reached. At this point retract the tube by a few millimeters and twist the tube 90 degrees. This will assist in opening the epiglottis.
- Watching the tube for condensation, advancing gently into the trachea during expiration. At this point a cough reflex is obtained.



- The rabbit is quickly connected to the anesthetic circuit and positive pressure ventilation can be utilised to increase to surgical anesthetic depth. It is advisable until the tube is secured to continue to hold both tube and head for security

The tube can then be secured, ideally with transpore tape. This not only prevents the small tube slipping through the traditional tie method but allows for quick and easy removal if required.

Note: in small rabbits and guinea pigs be conscious of not advancing the tube too far, this can result in intubation of a bronchi and affect anaesthetic stability.



Some authors have suggested pre placing of a size 3 oesophageal tube to obstruct the oesophagus can increase success of endotracheal placement. To place an oesophageal tube the neck is move in the opposite direction to above with the chin placed near the chest. This is easiest to achieve in lateral recumbancy. Caution should be taken, as with all intubation techniques to minimise trauma to the orotrachael cavity.

Nasotrachael tube placement

The benefits of nasotrachael intubation take advantage of the fact that rabbits are obligate nasal breathers; it can be easier to place then an endotrachael tube and does not require specific equipment. Disadvantages are nasal trauma, possible nasal infection and inability to perform positive pressure ventilation.

Nasal intubation involves using a 2-2.5 mm tube length approx 14.5 cm. Positioning as for a blind endotrachael intubation (see photo) the neck is extended and tube advance medially and ventrally into the nasal septum into to the nasal cavity. Another technique is described with the rabbit in dorsal recumbencey, still extending the neck into dorsoflexion. As with endotrachael placement successful positioning is checked with condensation in the tube.

Comparison of techniques for intubation

Technique	Pros	Cons
Blind technique	Requires no specific equipment other than uncuffed 1.5-3.5 tubes	Technician experience required
Laryngoscope Miller	May be useful in an emergency situation where condensation to access placement is not happening	Increased force can inadvertently be placed on the mandible when trying to achieve optimal visualisation. This can cause disruption of the masseter muscles causing irreparable dislocation of the mandible.
Otoscope visualization		
Endoscopic over the top	High visualisation minimizes trauma	Technician experience required and use of a semi rigid endoscope
Nasotrachael tube	Requires no specific equipment and can allow for easy oral cavity access.	Smaller tubes are necessary and Positive Pressure ventilation is difficult. Post anesthetic upper respiratory infection is common although not reported in cited article (Stephens Devalle)
Face Mask	No experience required.	Positive pressure ventilation by way of a tight-fitting mask can provide indirect ventilation; however, this method must be monitored carefully because aerophobia can occur and may lead to severe GI dilatation and tympany.
Laryngeal masks/airway tubes	Minimal experience required for successful placement	Requires specific equipment- V gel available from soundvet www.soundveterinary.com.au Rabbit Vgel $300.70 +gst each The D-grip (Mr Squiggle) is $187.80 +gst

There are many reports in the literature with various anaesthetic intubation techniques, many suggesting 100% intubation success even with non experience technicians. Veterinarians should not be disheartened as in many cases laboratory animals are used, commonly 3kg< New Zealand White Rabbits. These are an ideal size rabbit for the novice to attempt intubation, sadly this breed, or those of similar size are not common in our pet rabbits.

References

Brodbelit et al The risk of death: the Confidential Enquiry into Perioperative Small Animal Fatalities **Veterinary Anaesthesia and Analgesia Volume 35, Issue 5, pages 365–373, September 2008**

Montesinos A **Anaesthesia for your other patients** Proceedings SEVC 2010

Hawkins MG, Graham JE. **Emergency and Critical Care of Rodents** Vet Clin Exot Anim 10 (2007) 501–531

Hu S, et al **A miniature lighted stylet for endotracheal intubation in rabbits** The Veterinary Journal 195(2013) 254-256

Falcao S et al **Technique of blind tracheal intubation in rabbits(Oryctolagus cuniculi) supported by previous maneuver of esophageal cannulization** Acta Cir. Bras. vol.26 no.5 São Paulo Sept./Oct. 2011

Julie M Stephens Devalle **Successful management of rabbit anesthesia through the use of nasotracheal intubation.** J Am Assoc Lab Anim Sci. March 2009;48(2):166-70.

Brown S A (1997) **Clinical techniques in rabbits.** *Semin Avian Exotic Pet Med* **6** (2), 86-95.

Hillyer E V (1994) **Pet rabbits.** *Vet Clin North Am Small Anim Pract* **24** (1), 25-65

Varga M, **Textbook Rabbit Medicine** 2nd Edition

Johnston M (2006) **Clinical monitoring of the critically ill Rabbit** IVCS

Paul-Murphy J (2007) **Critical Care of the Rabbit** *Vet Clin North Am Exotic Anim Pract* **10** (2), 437-61

Lichtenberger M (2008) **Shock and Fluid Therapy in the Rabbit.** In: *Proc 51st BSAVA Annual Congress*. pp 169-171.

Hess L (2006) **Clinical Techniques in Rabbits** *NAVC*

Lichtenberger M (2008) **Anesthesia, analgesia and monitoring of the critical rabbit patient.** In: *Proc 51st BSAVA Annual Congress*. pp 160-163.

Neilson J (2006) **Welfare Considerations when Hospitalizing Dogs, Cats and Rabbits.** In: *Proc BSAVA Congress*. pp184-186.

Melbourne
Rabbit Clinic

745 Burwood Highway,
Ferntree Gully, Victoria 3156
Telephone: 03 9758 9879
Fax: 03 9758 1193
www.melbournerabbitclinic.com