

Euthanasia of Zoological Companion Animals

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Outline

- Introduction – What is Euthanasia?
- General Process
- Review Taxa – Small Mammals, Avian, Reptiles
 - Vascular Access
 - Sedation
 - Euthanasia
 - Confirmation of Death
- Resources

What is Euthanasia?

- *eu* = good
- *thanatos* = death

AVMA Guidelines for the Euthanasia of Animals: 2020 Edition*

“[E]nding the life of an individual animal in a way that minimizes or eliminates pain and distress. A good death is tantamount to the humane termination of an animal’s life.”

Goals of Euthanasia

For the ANIMAL

1. Induce death in a manner that is in accord with an animal's interest and/or because it is a matter of welfare
2. Use humane techniques to induce the most rapid and painless and distress-free death possible

For the OWNER

1. Facilitate as peaceful a transition as possible
2. Provide an opportunity to say goodbye

Goals of Euthanasia (con't.)

- Highest degree of respect
- Emphasis on making the death as painless and distress free as possible
- Handling and technique should minimize distress experienced by the animal prior to loss of consciousness
- **Rapid loss of consciousness**
- Cardiac and respiratory arrest
- Loss of brain function

While complete absence of pain and distress cannot always be achieved, balance the ideal of minimizing pain and distress with what is possible

General Process

The Owner

- Review protocol and expectations
- Will they be present for some, all, or none?

IV Access

- Is it possible to obtain?
- Will sedation be required?

Sedation

- What is the intended depth?
- Drug protocol and route

Euthanasia

- Route and volume
- Confirmation of death

Aftercare

- Keepsakes - fur, feathers, ink prints
- Body disposition

It is vital that the owner have the option to spend time with their pet PRIOR TO SEDATION and to maximize time together

Intravenous Catheters

- IVC typically facilitates an easier and more efficient euthanasia
- Owner can hold the pet
- Some patients will require sedation for placement
- **Balance** stress of placement, time away from owner, risk of IVC placement failure



Intraosseous Catheters

- Do not place just for euthanasia
 - Pain
 - Risk of fracture
- Use if already in place
- Reptiles and mammals
 - Femur, tibia
 - Very challenging in chelonians
- Birds
 - Proximal tibiotarsus
 - Proximal ulna



Sedation

- Route of administration
 - IV
 - IM
 - SQ
- No intent to recover
- Intended depth
 - IVC placement – mild to moderate
 - Pentobarbital IV without IVC – moderate to severe
 - Pentobarbital intracardiac – **anesthetic level – MUST BE COMPLETELY NON-RESPONSIVE TO NOXIOUS STIMULI**



Transmucosal Pentobarbital?

- Some species more tolerant than others
- May meet the definition of euthanasia but **IS NOT CURRENTLY IN AVMA**

Guidelines for Euthanasia

Zoo/Wildlife

Evaluation of Oral Transmucosal Administration of Pentobarbital for Euthanasia of Conscious Wild Birds

Sara Gardhouse ✉, Hugues Beaufreire, Michelle G. Hawkins, David Sanchez-Migallon Guzman, Sarah Jajou & Joanne Paul Murphy

Pages 4-14 | Published online: 10 Apr 2021

🔗 Cite this article 🔗 <https://doi.org/10.1080/10888705.2021.1911655>



AJVR



Transmucosal pentobarbital is a successful euthanasia method in pond slider turtles (*Trachemys scripta*)

Zachary C. Ready, DVM^{1,2}, and Krista Keller, DVM, DACZM^{1,2*}

AJVR



Transmucosal administration of pentobarbital and phenytoin solution induces euthanasia in bearded dragons (*Pogona vitticeps*)

Amanda D. Wong, DVM^{1,2}; Danielle M. Lang, DVM^{1,2}; Jacob P. Dalen, BS¹; Denise M. Imai, DVM, PhD, DACVP³; Krista A. Keller, DVM, DACZM^{1,2,4*}

How to Explain Intracardiac to a Client?

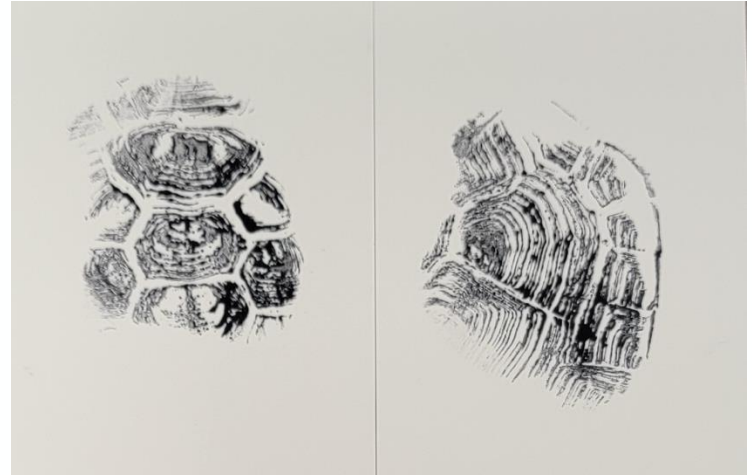
- “Because XX is so small [or compromised], we can’t place an IV catheter the way we’d like to, like we normally can in cats and dogs.”
- “So, the best way for me to help XX is to give the solution in a large vessel in the chest. XX won’t feel anything while I’m doing this - I’ll make sure of it before I give the medication.”
- “You can still be with XX while this is happening.”

Euthanasia

- Number of people present
 - Veterinarian
 - Owner
 - Veterinary technician
- Location of the patient
 - Owner's lap vs on a table
 - Who will restrain or position for administration?
- Administer pentobarbital, confirm death
 - Volume provided in charts at the end
- Provide owner the option to spend time with the body

Aftercare

- Fur
- Feathers
- Prints
 - Ink – especially feathers
 - Foam
 - Include tail – rats, lizards
 - Shell imprint for chelonians
- Private vs group cremation, take home for burial

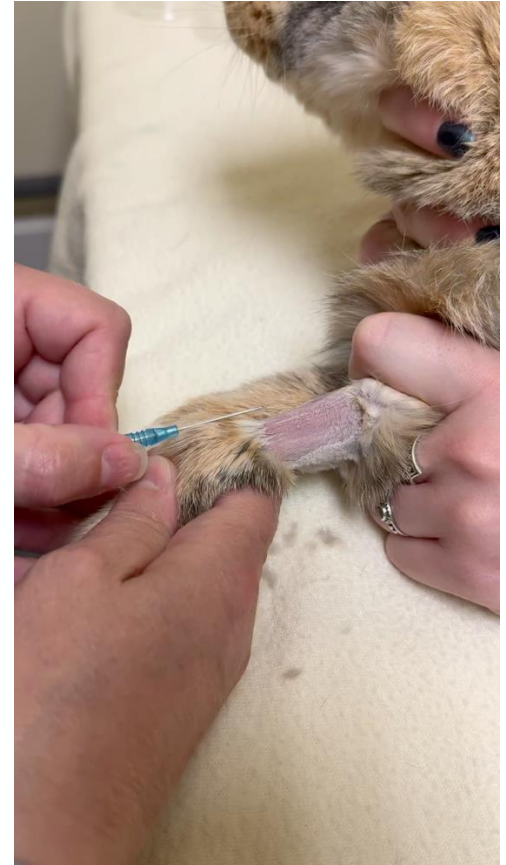


SMALL MAMMALS



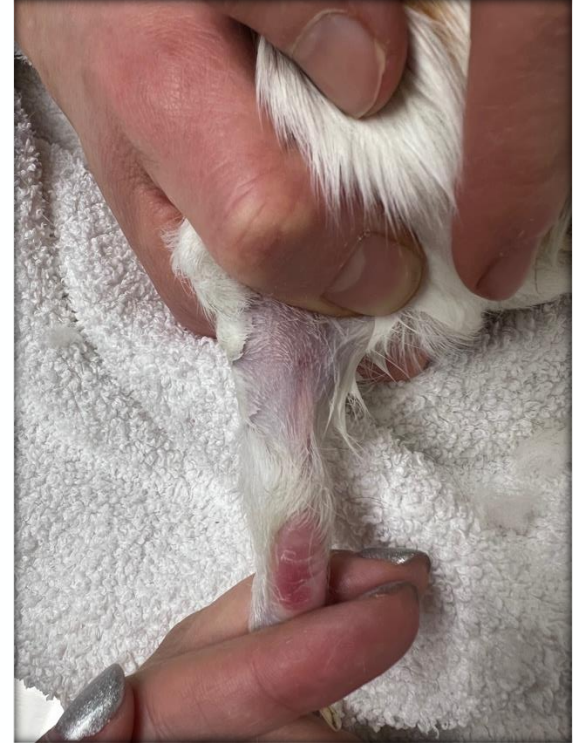
Vascular Access – Cephalic Vein

- **Recommended first**
- Rabbits, guinea pigs, chinchillas, and ferrets
 - Shorter forearms
 - Tourniquet style for holding off
- Smaller more delicate veins → 26g or 24g catheters
- Standard wrapping technique



Vascular Access – Lateral Saphenous and Popliteal Veins

- Sick, non-ambulatory rabbits
- Challenging to secure in guinea pigs, ferrets, chinchillas



Vascular Access – Marginal Ear and Tail Veins

- Marginal ear vein
 - Rabbits
 - Fragile and delicate
 - Pentobarbital can be thick – **DILUTE**
- Tail vein
 - Rats
 - Sedation/anesthesia



C/O Sarah
Ozawa

Sedation Protocols for Small Mammals

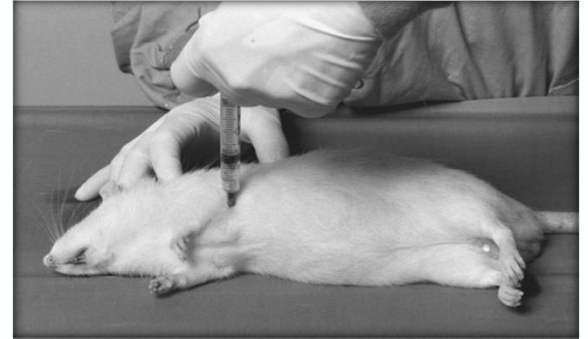
- If IVC/IOC is present
 - Midazolam 1-2 mg/kg
 - Propofol 1-3 ml
- IM or SQ administration
 - Ketamine 50-100 mg/kg + dexmedetomidine 0.1-0.3 mg/kg
 - Intracardiac pentobarbital
 - Midazolam 1-2 mg/kg + ketamine 5-10 mg/kg + butorphanol 1-2 mg/kg
 - IVC placement



Euthanasia Administration

- IVC, IOC
- Intracardiac*
- Intraperitoneal*
 - Potential for peritoneal irritation and pain
- Intra-renal*

***MUST BE COMPLETELY NON-RESPONSIVE TO NOXIOUS STIMULI**



Intra-Renal Euthanasia in Rabbits

- Respiratory arrest
 - IV – 11 seconds
 - IR – 3 minutes
- Cardiac arrest
 - IV – 12 seconds
 - IR – 6 minutes
- 7/25 needed rescue pentobarbital but IR 100% successful
- No distress
- Is up to 15 minutes before death acceptable?

COMPARISON OF INTRARENAL AND INTRAVENOUS EUTHANASIA IN RABBITS (*ORYCTOLAGUS CUNICULUS*)

NC STATE College of Veterinary Medicine

Jessica LeGrand, DVM

Sarah Ozawa DVM, DACZM

Marnie Metzler DVM, PhD, DACLAM

Jenny Estes DVM, DACLAM

Nina A. Moiseiwitsch

Jazz Stephens, DVM

Olivia A. Petritz DVM, DACZM

Confirmation of Death

- Similar to cats and dogs
- Cessation of breathing and heart beat
- Absent corneal reflex, fixed dilated pupil
- Eyes will **NOT** close
- **Method = stethoscope**

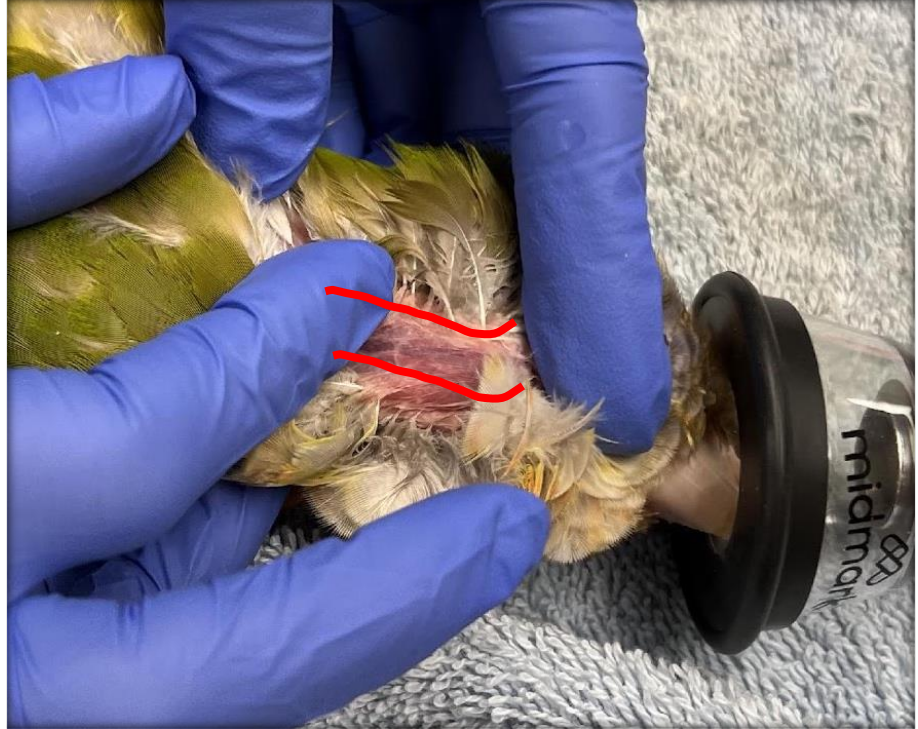


AVIAN



Vascular Access – Jugular Vein

- **Recommended first**
- **RIGHT** jugular larger than left
- Apterylae = featherless tracts
- Venipuncture and direct administration



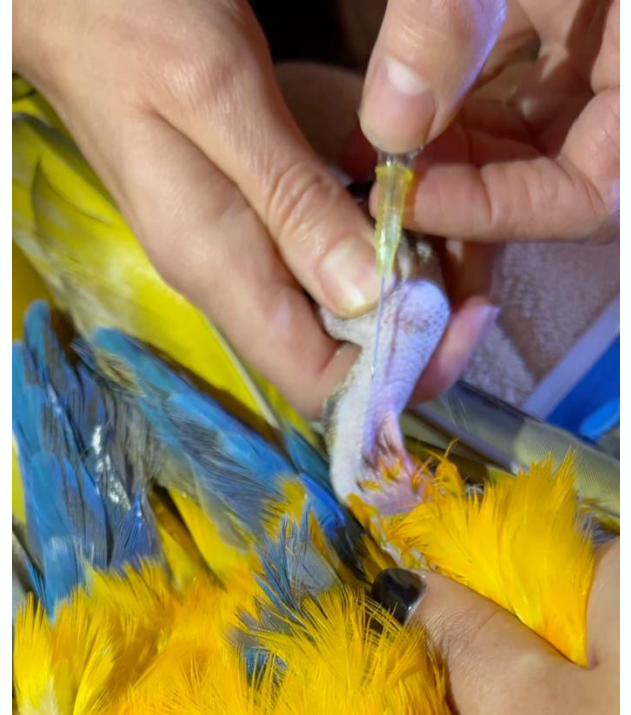
Vascular Access – Jugular Vein (con't.)

- IVC placement in waterfowl and poultry



Vascular Access – Medial Metatarsal Vein

- Larger parrots, all waterfowl and poultry
- IVC placement, butterfly catheter



Sedation Protocols for Birds

- If IVC/IOC is present
 - Midazolam 2-4 mg/kg
 - Propofol 1-3 ml
- IM administration
 - Parrots, pigeons/doves, perching birds – midazolam 4-10 mg/kg + butorphanol 4-10 mg/kg
 - Waterfowl, poultry – ketamine 1 ml + dexmedetomidine 1 ml
- Sevoflurane PRN – **NOT PRIMARY**



Complications of Euthanasia in Birds

- Some birds may flap or vocalize if not adequately sedated prior to pentobarbital
 - Consider forewarning owners
 - Ensure a firm toe or carpal pinch
- If an owner would like to be present – discuss positioning for jugular vein



Euthanasia Administration

- IVC
- IOC*
- Intracoelomic*
 - Potential for air sac administration (respiratory compromise, irritation, delayed absorption)
- Intracardiac*
 - Very challenging to impossible

***MUST BE COMPLETELY NON-RESPONSIVE TO NOXIOUS STIMULI**

Confirmation of Death

- Similar to cats and dogs
- Cessation of breathing and heart beat
- Absent corneal reflex, fixed dilated pupil
- **Eyes will CLOSE**
- **Method = stethoscope**

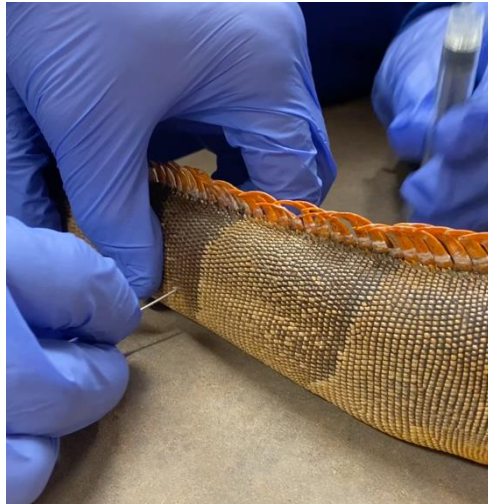


REPTILES



Vascular Access – Lizards – Coccygeal Tail Vein

- **Recommended first**
- **Ventral** to vertebrae
- Approach
 - Ventral
 - Lateral



Vascular Access – Lizards – Jugular Vein

- Lateral recumbency
- Lymph contamination
- Increases distress prior to sedation
- Not recommended unless for pentobarbital administration



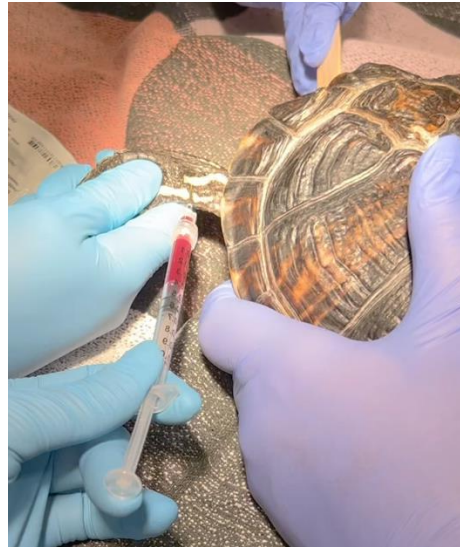
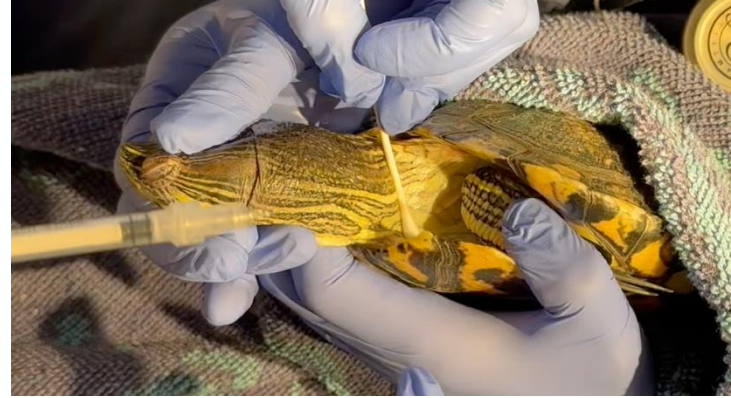
Vascular Access – Snakes

- Relatively challenging
- Strongly consider prioritizing IM/SQ sedation
- Coccygeal tail vein
 - **Ventral** to vertebrae
- Cardiac centesis?



Vascular Access – Chelonians

- Jugular vein
 - **Recommended first**
- Coccygeal tail vein
 - **Dorsal** to vertebrae
- Brachial plexus
- Subcarapacial sinus?
- Post-occipital sinus?



Complications of Euthanasia in Reptiles

- Tolerance to hypoxic and anoxic environments
 - Heart can continue to beat even if EEG consistent with death
- Death traditionally defined by absence of heart beat/electric activity
 - Not unusual to supplement with KCl 2 mEq/kg IV or intracardiac after high-dose pentobarbital administration
- Euthanasia takes longer than birds and mammals – forewarn owners
- **HYPOTHERMIA IS NOT AN ACCEPTABLE METHOD OF EUTHANASIA**

“[...T]he application of 2 or more euthanasia procedures is usually recommended.”

“Death should always be confirmed by physical intervention.”

Sedation Protocols for Reptiles

- IM/SQ injections in **CRANIAL THIRD OR CRANIAL HALF**
 - Renal **and** hepatic portal systems
- Ectothermic – keep warm to metabolize drugs
- Lizards and snakes
 - Ketamine 100 mg/kg + dexmedetomidine 0.5 mg/kg
- Chelonians
 - Ketamine 100 mg/kg + dexmedetomidine 0.5 mg/kg \pm alfaxalone 10 mg/kg



“Chemical restraint at high doses may serve as a first or preparatory step of euthanasia in some situations.”

Euthanasia Administration

- IV
- Intracoelomic*
 - No mention of irritation but mammals and birds are recommended to be non-responsive to stimuli
 - Consider the same for reptiles
- Intracardiac*
- **Pithing as second-step***



***MUST BE COMPLETELY NON-RESPONSIVE TO NOXIOUS STIMULI**

For Your Reference

End-of-Life Decisions

Palliative Care, Hospice, and Euthanasia for Exotic Animals

Angela M. Lennox, DVM, DABVP (Avian, Exotic Companion Mammal),
DECZM (Small Mammal)

Comparison of intraosseous pentobarbital administration and thoracic compression for euthanasia of anesthetized sparrows (*Passer domesticus*) and starlings (*Sturnus vulgaris*)

Joanne R. Paul-Murphy DVM

Andrew Engilis Jr

Peter J. Pascoe BVSc

D. Colette Williams PhD

Kate A. Gustavsen PhD, DVM

Tracy L. Drazanovich DVM

M. Kevin Keel DVM, PhD

Tamsen M. Polley MS

Irene E. Engilis

OBJECTIVE

To compare intraosseous pentobarbital treatment (IPT) and thoracic compression (TC) on time to circulatory arrest and an isoelectric electroencephalogram (EEG) in anesthetized passerine birds.

ANIMALS

30 wild-caught adult birds (17 house sparrows [*Passer domesticus*] and 13 European starlings [*Sturnus vulgaris*]).

PROCEDURES

Birds were assigned to receive IPT or TC (n = 6/species/group). Birds were anesthetized, and carotid arterial pulses were monitored by Doppler methodology. Five subdermal braided-wire electrodes were used for EEG.

9 March 2022

Evaluation of Euthanasia Methods Using Injectable Agents in Leopard Geckos (*Eublepharis macularius*)

Kyra Knutson, Olivia Petritz, Mandy Womble, Gregory A. Lewbart, Julie A. Balko

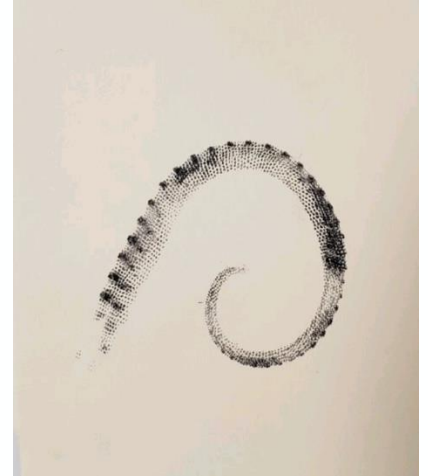
[Author Affiliations +](#)

J. of Herpetological Medicine and Surgery, 32(1):35-41 (2022). <https://doi.org/10.5818/JHMS-D-21-00006>

Monitor JAVMA and
AJVR for new
information

Confirmation of Death

- Respiratory arrest
- Absent corneal reflex
- **Eyes will close**
- **Primary method = DOPPLER or ULTRASOUND**
 - **No heartbeat for 2 minutes**
- Keep overnight?



Species	IVC	Sedation	Sedation level	Pentobarbital route	Amount
Rabbit	Easier Cephalic Lateral saphenous Marginal ear vein	Midazolam IV OR Combo IM	Midazolam - mild to moderate Combo – deep/light anesthesia	1. IV catheter 2. IV using butterfly (lateral saphenous)	1-2 mL
Guinea pig	Moderate, may need sedation Cephalic	Midazolam IV OR Combo IM or SQ	Deep/light anesthesia	1. IV catheter 2. Intracardiac 3. Butterfly in popliteal vein	0.5-1 mL
Chinchilla	Hard Cephalic	Midazolam IV OR Combo IM or SQ	Deep/light anesthesia	1. IV catheter 2. Intracardiac	0.5-1 mL
Small rodent (rat, mouse, hamster, gerbil)	Hard to impossible	Combo IM or SQ Add gas if needed	Light anesthesia	1. Intracardiac	0.25-0.5 mL
Ferret	Easier Cephalic	Midazolam IV or IM	Mild to moderate	1. IV catheter 2. Vena cava	0.5-1mL
Hedgehog	Hard	Combo IM or SQ Add gas if needed	Light anesthesia	1. Intracardiac 2. Vena cava	0.5-1 mL
Sugar gliders	Hard to impossible	Combo SQ Add gas if needed	Moderate	1. Intracardiac 2. Vena cava	0.5 mL

REMEMBER: Patients need to be **ANESTHETIZED and NON-RESPONSIVE** to a noxious stimulus before intracardiac or vena cava pentobarbital

Group	IVC	Sedation	Sedation level	Pentobarbital route	Amount
Passeriformes (canaries, finches)	Impossible	Combo IM Once sedated, supplement with gas anesthesia via facemask	Prior to gas inhalation: typically moderate to deep sedation With gas inhalation: anesthesia and non- responsive to all stimuli	1. Jugular vein	0.1-0.2 mL
Small parrots (budgies, cockatiels, conures)	Hard to impossible			1. Jugular vein	0.25-0.4 mL
Columbiformes (doves, pigeons)	Hard			1. Jugular vein	0.5-1 mL
Large parrots (African greys, Amazons)	Requires sedation Medial metatarsal Ulnar vein			1. Jugular vein 2. IV catheter 3. Butterfly in medical metatarsal vein	1-1.5 mL
Galliformes (chickens, turkeys, peafowl)	Easier Medial metatarsal			1. IV catheter 2. Butterfly in medial metatarsal vein 3. Jugular vein	Chickens: 1-2 mL Turkeys and peafowl: 2-4 mL
Waterfowl (geese, ducks)	Easier Medial metatarsal			1. IV catheter 2. Butterfly in medial metatarsal vein 3. Jugular vein	3-5 mL

REMEMBER: Patients need to be **ANESTHETIZED and NON-RESPONSIVE** to a noxious stimulus before intracardiac or intracoelomic pentobarbital

Group	IVC	Sedation	Sedation level	Pentobarbital route	Amount
Lizards	Hard to impossible IOC may be considered – humeral, tibial	Combo IV, IM, or SQ	Deep anesthesia	<ol style="list-style-type: none"> 1. Ventral coccygeal vein 2. Jugular vein 3. Intracardiac 	0.5-2mL
Snakes	Hard to impossible IOC not possible	Combo IM or SQ		<ol style="list-style-type: none"> 1. Intracardiac 	1-2 mL *may require additional KCl 2 mEq/kg*
Chelonians	May require sedation Jugular IOC may be considered but is exceptionally challenging – humeral, tibial	Combo IM, IV, or SQ		<ol style="list-style-type: none"> 1. IV catheter 2. Jugular vein 3. Dorsal coccygeal vein 4. Brachial plexus 5. Subcarapacial sinus 6. Post-occipital sinus 7. Intracardiac (hatchlings only) 	< 4 kg: 1 -3 mL ≥ 4 kg: 5 – 10 mL *may require additional KCl 2 mEq/kg*

REMEMBER: Patients need to be **ANESTHETIZED and NON-RESPONSIVE** to a noxious stimulus before intracardiac pentobarbital

Resources

- AVMA Guidelines for the Euthanasia of Animals: 2020 Edition
- Exotic Animal Emergency and Critical care (eds Graham, Doss, Beaufrère)



QUESTIONS?

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NOTICE

CE credit certificates & presentation slides will be emailed to you. If you do not receive an email with this information within a week, contact Nichole - *nicholemanfredi@capecodvetspecialists.com*

