

Post hibernation care of Terrestrial Chelonians

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There are a few species of tortoise that are typically presented to the veterinarian after hibernation. These include the Spur thighed tortoise (*Testudo graeca*), the Hermann's tortoise (*Testudo hermanni*), the Horsfield's tortoise (*Testudo horsfieldi*) and the Marginated tortoise (*Testudo marginata*). All of these species come from temperate regions and as a result their husbandry and the hibernation methods used are similar.

Preparing for Hibernation

Hibernation techniques vary. The tortoise should be prepared for hibernation by withholding food for 3 – 4 weeks, but still providing a water source. This is typically done by bathing the tortoise daily in a shallow bath of warm water for 20 minutes.

The tortoise should be kept warm for the first week and then reduced to room temperature for the remaining weeks prior to hibernation.

Monitoring weight is important and the bladder can comprise up to 25% of the bodyweight of a tortoise. Thus a well hydrated tortoise with a full bladder will weigh more.

Hibernation

Hibernation temperature should be kept between 2 – 8 degrees Celsius (°C). Any colder and there is a risk of frost damage and any warmer the tortoises' metabolic rate will increase and it will start to move.

Keeping the tortoise in an out-building in an insulated box (and placing this inside another insulated box) has been the typical method of hibernation used by many owners for

years. This is a reasonable method provided there is no risk of rodents gaining access to the tortoise and the temperature is closely monitored.

More 'high tech' owners will use fridges or chiller cabinets to maintain a temperature of 5°C. These work well, but monitoring temperatures is still wise. Maintaining sufficient humidity is also important and placing a small bowl of water in the fridge can help to reduce dehydration.

As well as problems post hibernation, Chelonians can be prone to frost damage and rat bites if maintained in unsuitable conditions during hibernation. For this reason hibernation in the garden is not advised as the risks are too great.

Hibernation is typically for three months duration, although this may be reduced or avoided completely in specific circumstances. The tortoise should be checked every week and weighed. A loss of 1% per month is considered acceptable.

The bladder in the tortoise acts as a reservoir for water. If the tortoise urinates, it should be woken from hibernation as it has just lost its water store.



Waking Up

Waking up from hibernation does not need to be a slow process. Ideally the tortoise should be kept at room temperature for a few hours prior to providing supplemental heat and a warm bath. Bathing should be performed daily until the tortoise is active, urinating and feeding.

All reptiles are ectothermic and require an external heat source to maintain their body temperature. Failing to provide an adequate thermal environment after hibernation is a common problem and is one of the factors that can lead to post hibernation anorexia. Tortoises are basking animals that require a focal hot spot of 40°C. If they are not provided with this, their body temperature will remain low and they will not start feeding.

Historically many cases were managed in the post hibernation period with vitamin injections or were tube fed and appeared to respond. This is likely to be because the environmental temperature warmed up subsequently.

Post Hibernation Care

The initial care of the post hibernation anorexic tortoise should focus primarily on providing optimal environment (warmth) and correcting any dehydration. After these areas have been addressed, the clinician can look towards providing adequate nutrition and improving long term management with the owner.

1. Environmental Heat Source

Firstly providing a tortoise with a suitable heat source is important and hospitalisation is frequently required. This should be a spot bulb directed from above to provide a basking site for the tortoise. A second heat source may be required and should be thermostatically controlled. Overnight temperatures should not drop below room temperature. Measuring the actual temperatures achieved with a maximum / minimum thermometer or a continuous recording device is ideal. Ultraviolet light should also be provided and one of the currently favoured sources is a mercury vapour lamp which provides heat and ultraviolet light in combination. All sources of heat and light should be kept protected from the tortoise to avoid the risk of burns.

2. Correct Hydration

Fluid therapy is important and the route chosen depends on how ill the tortoise is. There is no need to feed the tortoise at this stage as hydration is the priority.

For mildly dehydrated tortoises bathing is sufficient. Tortoises usually drink by submerging their entire head underwater and can take water in via their nose or mouth or even suck fluid into the cloaca and from there it can be absorbed.

In a sense, bathing allows dialysis of the tortoise via the bladder. The tortoise should be bathed daily in warm water (at about 25°C). There should be sufficient water for the tortoise to be able to lower its head and suck up the water via its nose. Warm water bathing also serves as a stimulus for voiding urates and faecal material.



A. The tortoise can be bathed in a cat litter tray filled with water of a sufficient depth to allow the tortoise to immerse its head.
B. Weighing the tortoise both before and after a bath is a good way of assessing the degree of rehydration that has occurred.



Terrestrial chelonians excrete uric acid (as opposed to urea). This forms insoluble urate salts in the bladder, which exerts no osmotic effect and as a result conserves water. Given the bladder is a water store a tortoise only passes urine when it has been rehydrated. Adding electrolytes to the bath is a good way to encourage increased fluid uptake and replace ions lost during hibernation.



In many cases admitted for treatment, oral or parenteral fluids will be required. Tortoises have a maintenance requirement of 30ml/kg body weight/day. Fluids can be given at the rate of 1% of bodyweight, up to four times daily, for rehydration. In severe cases, up to 6% of bodyweight may be given each day (typically by a combination of both oral and parenteral therapy). Fluids should be warmed prior to use.

Oral fluids can be administered using rubber, plastic or metal feeding tubes. The tube should be placed to avoid the glottis to a position between the junction of the abdominal and humeral scutes of the plastron.

Parenteral fluids can be administered via various methods including epicoelomic, intracoelomic, intraosseous or intravenous. Those fluids designed for use in mammalian species are appropriate (approximate osmolarity of 280-310mOsmoles). All sites should be disinfected with an iodine based scrub prior to injection.

Epicoelomic fluids are probably the easiest to administer and can be given just above the plastron in between the head and foreleg. Fluid is delivered into the potential space between the pectoral muscles and the plastron. There is considered to be a good degree of vascularisation in this region as the pericardial fluid in chelonians can act as a fluid store during periods of drought or hibernation. Before and after fluid therapy the tortoise should be kept warm in order to assimilate the fluids.



A. Normal urine. B. Concentrated urine with excessive biliverdin pigments. This occurs due to severe dehydration.

Urinalysis can be used to objectively assess hydration. Specific gravity can indicate the hydration status, as the bladder contents become more concentrated as dehydration progresses. Well hydrated chelonians have a specific gravity of 1.003 – 1.012. If dehydrated, this can elevate to 1.034. Urine pH is also useful. If the tortoise is catabolic, elevation in ketones can lead to a reduced pH. Urine from a healthy tortoise has a pH of 7.5.

Protocols for rehydrating chelonians vary, the author recommends using water only for stomach tubing and bathing for the first 24 hours and subsequently introduce

electrolytes. Some electrolyte products available for use in exotics also contain probiotics and prebiotics. These additives can similarly be absorbed by the oral or cloacal routes, along with the fluid and electrolytes and help re-establish the gut flora. Although extensive anecdotal support exists, there is still much work to be done in this area in exotics patients.

3. Provide nutrition

A variety of food sources should be offered whilst the tortoise is hospitalised. Mediterranean tortoises are vegetarian and no animal based food should ever be offered. The use of a variety of plants, leafy greens, and other organic vegetables should comprise the entire dietary intake.

Green leafy vegetables such as kale, spinach, broccoli, iceberg lettuce, romaine lettuce, cabbage, bok choy, turnip greens, endive, mange tout, spring greens, brussel sprouts, carrots (grated) can be offered. Naturally grown weeds such as dandelion, grass, sow thistle, plantains, chickweed, milk thistles, sedum, honeysuckle, nasturtium flowers, hibiscus flowers or wild pansy are an exceptionally good food sources and would be far preferable to supermarket goods.

If the tortoise is not feeding on its own, supportive nutrition is required but this should not be started until urination has occurred. This is because a chronically anorexic animal is deficient both in fluids, electrolytes and energy. Cellular constituents are depleted in order to maintain plasma levels which can mask deficiencies. Providing a glucose source to any animal encourages concurrent ion transport into cells. This can lead to reductions in plasma potassium and phosphorous levels. For this reason it is important to ensure that electrolytes are replaced prior to administering glucose.

High fibre products containing probiotics and prebiotics can be utilised and easily administered via stomach tube. 1% of the tortoises' bodyweight can be given at each time. Very weakened animals will require less than this. The animal must be warm to digest and assimilate the food.

4. Improve long term husbandry

The veterinarian's role includes the provision of accurate information to help eliminate recurrent problems in the individual's subsequent post hibernation periods. Often it may be necessary to seek the advice of an exotic veterinary surgeon to start appropriate treatment as soon as possible. Owners can be referred to sites such as www.britishchelonigroup.org for husbandry advice, www.uvguide.co.uk for the latest information on UV light sources and www.tlady.clara.net for dietary advice and a link to a tortoise seed mixture.





Stomach tubing is only a short term solution and some recalcitrant individuals may be impossible to stomach tube, it may therefore be necessary to fit an oesophagostomy tube to facilitate nutritional support. There are a number of commercially available products to use. High fibre products should be selected for the herbivorous chelonians. If supportive care fails to encourage feeding and voiding then a diagnostic work up should be performed. Depending on the case this may well be indicated on first presentation.

Bibliography and further reading

- ▷ www.britishchelonigroup.org
- ▷ www.tlady.clara.net
- ▷ www.uvguide.co.uk
- ▷ Meredith A & Redrobe S. 2002. *BSAVA Manual of Exotic Vets 4th Ed.* British Small Animal Veterinary Association, Gloucester.

About the author

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Kevin graduated from Bristol University Veterinary School in 1995 and started off in mixed practice whilst developing clientele with exotic pets. He obtained his certificate in zoological medicine in 2001. Subsequently time was spent working for wildlife hospitals, zoological collections, commercial clinical pathology laboratories and exotic pet practices. He obtained his diploma in zoological medicine in 2006 taking reptilian species as his specialist paper. He became an RCVS recognised specialist in zoo and wildlife medicine in 2007. He has lectured internationally about exotic animal species and is widely published. He now works as a Lecturer in Exotic Animal and Wildlife Medicine at the Royal (Dick) School of Veterinary Studies, providing clinical services to the exotic animal and wildlife service. He also acts as the veterinary liaison officer for the British Chelonia Group.

The Exotic Animal and Wildlife Service offer a 24 hour referral service run by their own clinicians. Every exotic animal referred to the Exotic Animal or Rabbit Clinic benefits from input into case management from specialist clinicians with a wide range of expertise. The expansion of the team now includes Europe's first Lecturer in Rabbit Medicine and Surgery, Brigitte Reusch. The team is backed up by the existing services offered by the 'Dick Vet' which allows other disciplines to be involved in the evaluation of specific conditions in much more depth. To book an appointment with The Exotic Animal or Rabbit Clinic contact reception on 0131-650 7650 or visit their website www.dickvetexotics.com for more information.

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