

ADVICE ON HUSBANDRY AND MANAGEMENT OF CHELONIANS

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CHELONIANS, otherwise known as tortoises, terrapins and turtles, are one of the oldest group of reptiles, having evolved more than 220 million years ago.

Those that live a terrestrial lifestyle are generally known as tortoises and those living an aquatic or semi-aquatic lifestyle as terrapins or turtles, but this terminology may vary in different countries.

Chelonians have many fascinating adaptations that allow them to avoid predation and survive extreme environmental conditions, such as low oxygen environments or prolonged periods of cold weather. However, their ability to survive without showing obvious external signs of problems can present a challenge for the veterinary surgeon. Their rigid shells limit clinical examination, diagnostic procedures and surgical approach. Thorough history taking therefore becomes particularly important when evaluating a sick chelonian and a good understanding of husbandry and diet is vital as many problems are related to deficits in these areas.

Natural behaviour and housing needs

Chelonians are found throughout the world, both in temperate and tropical locations, so different species will have different requirements in captivity. It is extremely important to correctly identify the species of tortoise presented to be able to advise on correct husbandry. Websites such as

www.tortoisetrust.org or www.britishchelonigroup.org.uk provide further details on species identification and species-specific husbandry recommendations.

A few basic principles can apply to all, as listed below.

Enclosures should be secure (both to prevent escape and predator attack), easy to access and easy to clean. They should be as large as possible to allow animals to move about freely (at least three to five times body length is recommended, but larger is preferable). Good ventilation is essential to prevent respiratory disease so vivariums are generally unsuitable for longterm housing of terrestrial species. Instead, open-top tortoise tables are available for small animals and larger individuals may be housed in open-top pens, conservatories or outhouses adapted for this purpose. Ideally, both outdoor and indoor access should be provided during warm weather. Historically, many tortoises have been left free-range in the garden to fend for themselves. These tortoises have usually “survived” for years, but not necessarily thrived in the British climate without additional heating, and predator attacks are not uncommon.

Chelonians are ectotherms (animals that regulate their body temperature using energy derived from external heat sources) and consequently their metabolic processes function best when warmed to an appropriate temperature. Supplementary heating will need to be supplied and indoor enclosures will need both a primary (background) and secondary heat source (such as a basking lamp). The ideal temperature range will depend on the species, but in Mediterranean tortoises (*Testudo* species) may range from 20°C at the cool end to 35°C to 40°C at the basking spot. Use of a digital maximum-minimum thermometer is strongly advised to allow measurement at both the hot end and cooler end of the enclosure over a 24-hour period.

Supplementary UVB lighting should be provided for all chelonians when kept indoors. UVB light is important for the production of endogenous Vitamin D₃ and consequently the prevention of metabolic bone diseases. Lights will need changing regularly (at least every six months for most brands) as UVB output diminishes with time. A photoperiod of 12 hours light and 12 hours dark is recommended for tropical species, whereas those from temperate climates may benefit from varying the light period on a seasonal basis.

Diet should be considered, including what the owner feeds the pet and what the animal actually eats. Ideally, the captive diet should be based on what the species eats in the wild. For example, for Mediterranean tortoises a primarily weed-based diet is advised, although shopbought salad mixes and dark leafy greens may also be fed in small quantities. Vitamin and mineral supplements should be used regularly to prevent dietary deficiencies, especially in growing or reproductively active animals.

Common problems and veterinary care

Once husbandry and diet have been discussed, a full clinical examination of the chelonian patient

should be performed. A cold reptile cannot be properly assessed so animals may need to be admitted to be warmed up for full assessment, especially to evaluate mobility. Observation from a distance is particularly important due to the tendency to withdraw into the shell. Sedation may be needed to examine shy individuals or those with hinges, which can completely seal themselves into their shells.

A variety of problems may be seen, but a few common presentations are listed below.

Post-hibernation anorexia

Hibernation is a natural part of many tortoises' annual cycle, but also the time of year most likely to be associated with health problems. These may include immunosuppression, dehydration, freezing, rodent attack or other trauma, but the most common presentation is partial or complete anorexia after emerging from hibernation ([Figure 1](#)).

Most tortoises should eat within a few days of hibernation, but if not eating within a week then treatment will be necessary. Initially on presentation, it is important to establish the species of tortoise as tropical animals will never naturally hibernate. Full details of hibernation including technique (in garden/box fridge), hibernation temperatures if measured and length of hibernation should be obtained. Many tortoises are hibernated for prolonged periods in captivity, often up to six months, unlike their wild counterparts that often only hibernate for under three months. Prolonged hibernation may lead to diminished energy reserves and dehydration, especially if temperatures are unregulated and the animal moves around or urinates during this period.

A full clinical examination should be performed as many patients have secondary infections such as stomatitis or respiratory disease following immunosuppression. Depending on clinical findings, further diagnostic tests may then be indicated. All anorexic patients will require supportive treatment initially, including warming and rehydration followed by nutritional support once rehydrated. Medical treatment of chelonians requires time and patience as response is often slow. Owners should be prepared for this at initial presentation to avoid unrealistic expectations.

Shell trauma

Dog or fox bites and lawn mower injuries are particularly common during summer when tortoises have more outdoor access ([Figure 3](#)). Analgesia, antibiotics and fluid therapy should all be considered for initial stabilisation of the trauma patient. Wounds should then be assessed, cleaned and flushed as appropriate. General anaesthesia and imaging may be required to investigate the extent of trauma, for debridement and to stabilise any fractures. Extensive wounds may be successfully managed if treated at an early stage, although owners should be warned healing will take months to years if there is a full thickness shell deficit.

Cloacal prolapses

Cloacal prolapses may occur for many reasons, including gastrointestinal disease (for example, impaction or parasites), dystocia, urolith, neoplasia, spinal damage, hypocalcaemia, trauma and any other condition leading to straining or muscle weakness (Hedley and Eatwell, 2014).

It is important to distinguish exactly which organ has prolapsed and to identify the underlying cause if possible ([Figure 4](#)). The prolapse may be simply cleaned and replaced or may require more complex surgery depending on cause.

Dystocia

Chelonians with dystocia may have a history of egg laying and show signs of restlessness and straining or alternatively may present with non-specific signs such as lethargy or anorexia. Prolapse either of the oviduct or just the cloaca may also occur. Predisposing factors include lack of a suitable nesting site, stress, lack of suitable ultraviolet lighting, lack of dietary calcium, or other underlying disease.

Diagnosis may be obvious, based on history and clinical signs, but radiography will be required to confirm the diagnosis. Normal eggs appear oval with a thin radio-opaque shell, but eggs that have been present for some time may appear roughened or irregular and these are often the ones that cause dystocia.

The finding of eggs on radiography may be incidental and unrelated to the animal's problem and it is important to assess if eggs are likely to cause obstruction or whether they will pass through the pelvis normally before deciding whether to initiate medical treatment ([Figure 5](#)). In some cases, correcting any underlying environmental stressors and providing a warm, secluded nesting area may result in natural egg laying without further intervention.

However, if eggs have been present for some time and are resulting in clinical signs, treatment is likely to be required. Initial medical treatment involves correcting any fluid deficits followed by administration of oxytocin (2IU/kg to 10IU/kg IM). Oxytocin may need to be repeated once or twice at 90-minute intervals, and, if a suitable nesting area is provided, eggs are often passed without difficulty. The off-label use of medication will need to be considered and clients made aware. The administration of calcium before oxytocin treatment has been advocated ideally based on blood parameters, but if this is not possible in an emergency situation, it is important to ensure the tortoise is well hydrated first. Beta-blockers, such as atenolol, have also been used and appear to potentiate the effects of oxytocin.

If medical treatment is ineffective or eggs are too large or misshapen to be passed, surgery may be required to remove the eggs by salpingostomy or to perform an ovariosalpingectomy. In some cases animals may have attempted to pass eggs that have moved into the cloaca and been retropulsed into the bladder, so it is important to try to identify the location of the eggs in animals unresponsive to medical treatment (Thomas et al, 2002).

Upper respiratory tract disease (runny nose syndrome)

Tortoises with upper respiratory tract (URT) disease are a common presentation to the veterinary surgery, especially post-hibernation when their immune system may not be fully functional. Herpes virus and *Mycoplasma* are two of the most common causes of disease, although various “new” viruses, such as ranavirus and paramyxovirus, have also been reported.

Herpes virus is widespread throughout the UK tortoise population, especially in spur-thighed and margined tortoises (Soares et al, 2004). These species may show clinical signs or just act as asymptomatic carriers. Hermann’s, Horsfield and Leopard tortoises, in contrast, usually present with more severe signs. Different strains of herpes viruses can also have varying pathogenicity in different species.

Signs of disease include nasal discharges, stomatitis, anorexia, lethargy, weight loss and even death. Occasionally, systemic infection with multiorgan involvement is seen. Diagnosis in a sick tortoise is usually based on taking an oral swab or nasal flush for PCR, but false negative results may occur as the virus is only shed intermittently.

For screening healthy tortoises, herpes virus serology may be more appropriate, but is not widely available. Management of a herpes positive case is mainly by supportive care, although acyclovir has been used at 80mg/kg tid po with varying success to reduce clinical signs.

Mycoplasma is also widespread throughout the UK tortoise population causing particularly severe signs in Horsfield and Leopard tortoises (Soares et al, 2004). Clinical signs are similar to that of herpes virus, although ocular signs are more common with *Mycoplasma* infection and stomatitis with herpes virus. Diagnosis in a sick tortoise is also based on taking a swab for PCR, but as with herpes virus, false-negative results may occur. Affected individuals may be treated with fluoroquinolones, tetracyclines or macrolides, but owners should be warned, as with herpes virus, that this condition can be managed, but not generally cured. Husbandry deficits should be corrected and any potential stressors eliminated to reduce recurrence of clinical signs. Again, the off-label use of medication will need to be taken into consideration and clients made aware.

Common techniques

Venipuncture

Chelonians may be blood-sampled from many different sites, including the jugular vein, subcarapacial sinus and dorsal coccygeal vein.

Each site has advantages and disadvantages, and accessibility may depend on species and temperament of the individual animal. Sampling from the jugular should ensure the least chance of lymph dilution, but may be difficult in some cases, especially in non-compliant animals ([Figure 6](#)).

The subcarapacial sinus has been suggested as a suitable alternative, but lymphatic vessels lie just cranial to the venous sinus so samples may be diluted (Hernandez-Divers et al, 2002).

The dorsal coccygeal vein lies at the dorsal midline of the tail and may be easily accessed in many animals by a single operator without the need for additional restraint. The main disadvantages are the potential to introduce infection in this contaminated area and lymph dilution. Thorough disinfection of the site should reduce the likelihood of iatrogenic infection, but lymph dilution remains a concern.

References and further reading

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Figure 1. This tortoise was presented for post-hibernation anorexia after self-hibernating in the garden for up to six months.



Figure 2. Bathing can be a useful route of rehydration in chelonians.



Figure 3. Dog bites can result in significant shell deficits.



Figure 4. This tortoise had recurrent cloacal prolapses associated with reproductive activity.



Figure 5. This egg was passed following treatment with oxytocin.



Figure 6. Blood samples can be taken from the jugular vein in cooperative patients.

