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Basic husbandry and common health problems associated with Mediterranean tortoises

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ABSTRACT: Knowledge of tortoise husbandry and welfare has come on by leaps and bounds in the past few years and nurses can now achieve much more in the education of clients in practice. The aim of this article is to provide and encourage implementation of a basic knowledge of tortoise husbandry. Common problems associated with poor husbandry will be included to enable the nurse to promote the welfare of these challenging patients.

A veterinary nurse has many roles in general practice, one of those being the promotion of animal welfare. Knowledge of reptile welfare is slowly coming up to par with that of other small animal species and one of the ways this has improved is through a better understanding of basic husbandry.

For tortoises, this can make the difference between a life well lived or a life plagued with disease and discomfort. This article will discuss basic tortoise husbandry and common conditions associated with poor husbandry.

The most commonly encountered species of Mediterranean tortoises in the UK are Hermann (from Italy, France and the Mediterranean), Horsfields (from Eastern Europe and Asia) and the Spur-thighed (from Europe, Asia and Africa).¹

This article will primarily focus on the care and husbandry of the Mediterranean tortoise.

Housing

Mediterranean tortoises should have access to both an indoor and outdoor enclosure preferably spending as much time as possible outside, weather permitting.

Outside

The natural habitat of Mediterranean tortoises consists of dry sloping ground

with plenty of places to hide from predators and areas in which to dig.

An easy structure for a tortoise house is to use the sides of a children's sand pit or large rabbit cage which can be adapted by applying a strong wire mesh both underneath the substrate and above the unit. This will prevent the tortoise from escaping and will prevent predators (foxes, rats, dogs and large birds, such as parrots) from causing injury.²

An enclosure at least 90cm long by 30cm wide is recommended for juvenile tortoises, while adult tortoises should be provided with as much space as possible. The tortoise must have enough space to exercise, a basking area, good ventilation and areas of shade to move to for thermoregulation.¹

The enclosure's substrate is of the upmost importance as wet or clay-like substrates may result in respiratory and shell infections which can be fatal. The substrate must be non-toxic to tortoises, allow them to burrow and must be easily cleaned. Examples include a 50/50 soil to sand ratio or some of the commercially available substrates.^{1,2} Care must be taken when using sand owing to the risk of intestinal blockages if the tortoise ingests the sand.³

Generally, newspaper is the best option both in practice and at home owing to its cleanliness and availability, although adding some soil will encourage natural

burrowing behaviour. The enclosure needs to be spot cleaned everyday but a thorough clean should be conducted on a weekly basis using a good disinfectant such as F10.¹

Possibly the most important element of a tortoise enclosure is creating a microclimate. This consists of areas of specific conditions such as temperature, lighting and humidity.⁴

Tortoises, as with all reptiles are ectothermic, meaning they rely on the external environment to achieve their preferred body temperature (PBT).³ A background temperature of around 20°C is acceptable for all Mediterranean species while the preferred optimum temperature zone (POTZ) for basking should be between 29-32°C for Horsfields, 30°C for Spur-thighs and 32°C for Hermanns.^{5,6,7}

This can be achieved in an outside enclosure by creating a mini-greenhouse (use a gardener's cucumber frame with a transparent roof). The temperature inside these structures will generally be approximately 10°C warmer than outside the mini-greenhouse making it the perfect POTZ where they can move to thermoregulate. It is advisable to have a maximum/minimum thermometer to make sure the PBT is being achieved.²

In the Mediterranean tortoise's natural habitat, the level of ultraviolet rays is higher than they are in the UK. The 'A' wave of ultraviolet light (UV-A) is involved with appetite stimulation and mating, the 'B' wave (UV-B) is probably the most important because it is absorbed by receptors in the skin and is involved with the production of vitamin D₃ as well as the metabolism of calcium and bone growth. Therefore, a suitable source of artificial lighting will be required and can be purchased from most pet retail stores.⁶

Humidity is generally not a concern with these tortoises and maintaining a range between 25 to 50 per cent is acceptable by using a humidifier.³

Environmental enrichment is relatively important to a tortoise's well-being and is often overlooked in veterinary practice. It is best to create two hiding areas (one near the POTZ and one away from it) to allow the tortoise to digest food, to rest and retreat to safety if it feels threatened.³

⁴ Hollowed out logs, cardboard boxes, torn up newspaper, rocks and non-toxic plants will cater well for this.¹

Shallow water bowls should also be submerged into the ground to aid the uptake of water and should be deep enough for tortoise to submerge. Often a litter tray is adequate.⁴

Indoors

As space can often be a problem in veterinary practice, it is important that if patients are to be kept indoors – albeit short term – that nurses should strive to do their utmost to recreate as close to a natural environment as possible.

One of the main concerns regarding the use of fish tanks as enclosures is that they are highly stressful for tortoises because they are able to see through the glass but not move beyond it.² A standard kennel with newspaper as a substrate is acceptable, but where possible, some soil or a burrowing substrate should be used to allow partial burrowing. Hiding areas and water trays should be supplied as previously discussed for the outdoor enclosure.⁴

An infra-red or ceramic heat lamp is needed to create a POTZ with the lamp overhead at 30cm - 45cm from the floor or base of the cage.² Heat lamps should be kept on continuously. As the tortoise must be exposed to UV-B lighting, using specialist UV-B bulbs is advised and these should be kept on for 12 hours a day to ensure normal behaviours and activities, such as digestion, can be undertaken.

All bulbs should be checked regularly and replaced as advised by the manufacturer. A minimum/maximum thermometer should be in place to monitor for temperature fluctuations.¹

Feeding and water uptake

Unfortunately, it was mistakenly believed in the past that it was acceptable to feed cat or dog food when in fact tortoises are exclusively herbivores. They require a high fibre and high calcium diet consisting of weeds (dandelions flowers and leaves, thistles, honeysuckle, for example) and dog/cat food, peas, beans and large amounts of fruit must be avoided as they contain high levels of fat, sugar, protein and carbohydrates respectively.^{1,2}

Supermarket-bought salads can be fed if there are no alternatives. It is advised to supplement all foods with a vitamin/mineral powder supplement which includes calcium.

Nutritional provision for these sensitive creatures must be carefully designed and well researched, as liver and kidney complications are often irreversible and should not be allowed to occur.¹

Water intake is essential despite the myth that tortoises obtain all the water they need through their food. They need daily baths in water at POTZ to drink and must always have constant access to it or water deprivation will lead to kidney disease and bladder stones. Often, after drinking, a white substance (uric acid) will be produced from the cloaca which is a normal waste product of protein metabolism.

Regular bathing in water will also aid thermoregulation.²

Common problems associated with inappropriate husbandry

Post-hibernation anorexia

Discussion of the process of hibernation is beyond the scope of this article.

Poor husbandry before, during and after hibernation can cause post-hibernation anorexia. Issues such as hibernating for longer than three months or a tortoise being unwell before hibernating can lead to problems.

Often, tortoises will have leucocytopenia when awaking from a hibernated state. This can become an issue if any bacteria or viral diseases are present as aiding thermoregulation following hibernation will cause bacteria and viruses to multiply, causing further complications.⁸

If the infection is left untreated, dehydration and malnutrition will occur. Treatments will often be simple – such as encouraging feeding, drinking, urinating and defaecating – as well as bathing twice daily. If spontaneous feeding does not occur after hibernation, it is advised to force feed directly into the stomach using a stomach tube and feeding a high fibre recovery diet, such as Oxbow Critical.⁸

Bladder stones (calculi)

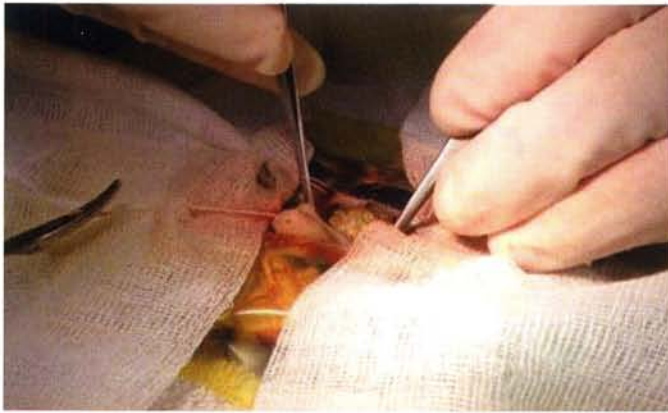
Small accumulations of calculi are quite normal and will pass without causing any harm. If there is excess potassium and protein in the diet, a level of dehydration, a decrease in bladder emptying or even a pre-existing condition causing secondary bladder stones, larger accumulations



Figure 1. Bladder calculi
Using a dremel saw to cut a window in the plastron to gain access to the bladder



Window created following dremel sawing



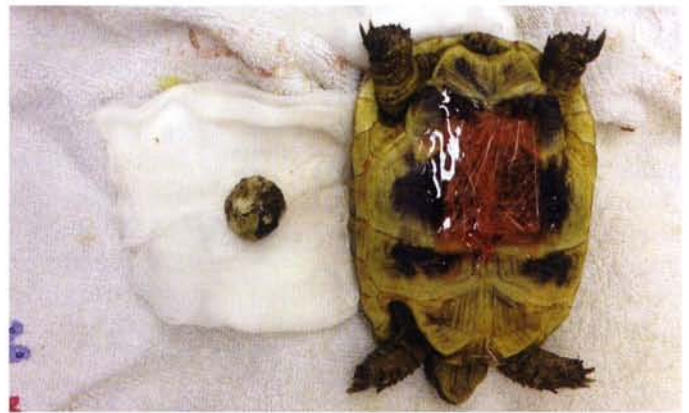
Stay sutures holding bladder in place. Bladder calculi beginning to surface



Plastron window in place for setting with fibreglass



Fibreglass setting



Note size of calculi in comparison to the patient

may develop and these are harder to void without professional involvement.⁹

Clinical signs of this condition are only noticed if the calculi are large, owing to the damage caused to the bladder. You would expect to see haematuria, dysuria, hind limb dysfunction, penile prolapse, problems with urinating and defecating resulting from the blockage of the cloaca.¹⁰

A diagnosis can be obtained by taking X-rays in dorsal recumbency or through palpation of the cloaca (gently rolling the tortoise from side to side and feeling calculi movement).

Often, coeliotomy/cystotomy surgery is needed to remove larger calculi if they cannot be passed naturally. A good sedation is used to achieve relaxation while the veterinary surgeon will pass a suitable sized ET tube in order to maintain anaesthesia by means of the administration of isoflurane anaesthetic gas.

It is particularly important to mention that tortoises will often not breathe for themselves under anaesthetic so the nurse should be ready to use IPPV should the need arise.¹⁰

See **Figure 1** for a step-by-step guide to the surgical procedure.

Traumas and amputations

Unfortunately, trauma and amputations are commonplace, although they can easily be prevented. Dog, cat and rat bites seem to be the main cause as a consequence of poor enclosure structure.

The author has seen a case of a tortoise attacked by a dog which left it with two deep wounds to the shell. Both these wounds were cleaned every three days with diluted iodine and dressed with a melolin and Vetwrap dressing (**Figure 2**).

Another case was of a tortoise that needed a limb amputation owing to a fracture. Preservation should always

be of the upmost concern, although any fractures above the carpus/tarsus should be considered for amputation, particularly if osteolysis is involved.¹¹

The limb should be removed at the scapulo-humeral joint or coxo-femoral joint and a skin flap left to close the wound following amputation.¹²

A prosthetic limb must be attached to the plastron either using a wheel or deodorant roller to aid movement (**Figure 3**) and prevent shell erosion.^{11, 12}

Metabolic bone disease

This is the broad term used to describe calcium loss from the bones. If tortoises have not been exposed to UV-B light, uptake of calcium from the digestive system will be reduced and the body will compensate by removing calcium from the bones (demineralisation).

Patients will often present with a soft shell, lameness and seizures. Diagnosis through radiographs may be useful in interpreting bone density. Blood analysis would identify abnormal calcium levels.

Questioning owners on the husbandry of the tortoise would be a first step in trying to combat this condition. UV-B lighting issues or dietary changes needed for the uptake of calcium can be identified. Supplementation may also be needed if there is any uncertainty regarding how much calcium is available. Increasing dietary calcium uptake by feeding greens and less calcium binding vegetation, such as spinach or cabbage, is a good start.

Pain management as a long-term solution should be evaluated and the use of bisphosphonates (a group of drugs that inhibit osteoclasts from digesting bone) is in need of further research to help benefit this species. Generally, most cases do well, although severe cases will have a guarded prognosis.¹³

Upper respiratory tract disease (URTD)

Possibly the most common condition seen in practice post hibernation is URTD, otherwise referred to as 'runny nose' syndrome (inflammatory nasal lesions). Foreign bodies, such as grass or dust, can predispose tortoises to this condition as well as a decrease in seasonal temperatures; or through mixing tortoise species, spreading herpes virus and mycoplasma and causing immunity depression.



Figure 2. Bandaging Wounds obtained after a dog attack



Cleaning wounds with diluted iodine solution



Melolin dressing attached with micropore

Vetwrap applied to hold dressing in place. Change every 3 days





Figure 3. Limb Amputation
Using a deodorant roller ball as a prosthetic limb to prevent damage to the shell and aid movement



Placement of a feeding tube to aid nutritional uptake during recovery



Administering recovery formula post-surgery

Clinical signs include yellow/green nasal discharge and neck swelling. Diagnosis can be confirmed through blood tests, swabbing of the nasal cavity, chest X-rays and endoscopy.

The nurse's role can really come into play with this condition as barrier nursing is essential for preventing disease transmission to other reptiles. Patients should be hydrated, treated with antibiotics depending on swab analysis

results, be kept warm and not allowed to mix with other tortoise species.

Quarantine of individuals with this condition for 12 months following diagnosis will prevent transmission between groups.⁸


Conclusion

On reflection, keeping tortoises as pets is a challenging task for any individual,

although if the appropriate research is conducted, tortoises can live very happy lives.

The veterinary nurse can play an important role in advising clients on the best husbandry and diet for these pets as well as the common complications that may arise. This should ensure that the incidence of these problems will become a thing of the past and the general welfare of tortoises will be promoted to the benefit of all concerned.

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Additional reading

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