Fluid therapy for exotic species

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Mary Fraser BVMS, PhD, CertVD, PGCHE, FHEA, CBiol, MIBiol, MRCVS gives guidelines on maintenance fluid types, volumes and routes appropriate for small mammals, reptiles, amphibians and birds

MANY aspects of fluid therapy applied to cats and dogs can be transferred to the treatment of exotic species. However, there will also be times when treatment will be specific for the species that you are dealing with. This article will therefore focus on the features of fluid therapy specific to exotic species.

Small mammals

Fluid requirements

Small mammals generally have higher maintenance fluid requirements than cats and dogs (see). This is due to a combination of higher metabolic rates, higher glomerular flitration rates and a high lung surface area, meaning greater losses due to respiration. Reasons for fluid loss are similar to those in cats and dogs, and include surgery and diarrhoea.

Assessment of the degree of dehydration can be made on history and clinical findings, as shown in . Alternatively, if blood samples have been taken, an increase of one per cent in the packed cell volume can be taken to be equal to a fluid deficit of 10ml/kg bodyweight.

Types of fluids

Fluids administered to small mammals are similar to those used in cats and dogs. Therefore, Lactated Ringer's can be used in cases of metabolic acidosis; glucose/saline can be used in cases of urolithiasis; and colloids/blood transfusions can be used where crystalloids alone are not sufficient.

Blood transfusions are not something that will be carried out routinely in small mammals, but this is not a reason to discount them. It is possible to give blood transfusions to rabbits, guinea pigs and even rats, although the volume of blood transfused will be small. A volume of blood equal to one per cent of bodyweight can be removed from the donor into a pre-heparinised syringe and then transferred slowly to the recipient. One-off blood transfusions appear safe, but cross-matching should be performed, as for cats and dogs, if multiple transfusions are required.

Administration of fluid therapy

When dealing with small mammals, it is likely that handling will be stressful for your patients. To reduce stress it is tempting to give subcutaneous fluids. It is possible to give large volumes of fluid by this route; however, it is not without problems, such as fur slip in chinchillas, and a slow speed of rehydration, especially where cases have poor peripheral circulation. Therefore, it may be preferable to give fluids by another method, such as intravenously or intraosseously. The rate of rehydration is much quicker, and fluids can be given continuously.

However, in cases where the gastrointestinal tract is working, this should be used for fluid therapy. Gastrointestinal fluid administration may be used in association with other methods of fluid administration. To reduce the amount of handling required, a naso-gastric or naso-oesophageal tube may be put in place in larger small mammals, such as rabbits, guinea pigs or chinchillas.

The size of the animal's stomach will limit the amount of fluid that can be given at any one time. As a guide, a rabbit's stomach will hold 10ml/kg, whereas rodents can take 5-10ml/kg.

Intravascular access is the most reliable method of giving fluids; however, in small mammals it may sometimes be difficult to gain access to small blood vessels. Most commonly, butterfly catheters are used for intravenous fluid administration in small mammals as they are easier to handle and to hold in place. In rabbits, the lateral ear vein is the most accessible, but the saphenous and cephalic veins also allow vascular access. Due to the small volumes of fluid being administered it is helpful to use a syringe driver.

Sometimes it may be difficult to achieve intravascular access. In these cases, the intraosseous route may be preferable, using a 23-25g spinal needle. In small mammals the proximal femur, humerus or tibia can be used for intraosseous access. It is vital that sterility is maintained prior to, and during, intraosseous fluid administration and that analgesia is provided.

Intraperitoneal injections allow larger volumes of fluids to be given, and absorption of fluids into the

cardiovascular system is quicker than that given subcutaneously. However there is always the risk of puncturing abdominal organs, especially when dealing with herbivores, which can have capacious large intestines.

Fluids should be warmed prior to administration. As small mammals are prone to losing heat, fluids should be kept warm during administration to reduce heat loss. It has been suggested (Dix et al, 2006) that it may be beneficial to prewarm both the fluids and the giving set, and keep both the fluids and giving set wrapped during administration.

Reptiles and amphibians

Causes of dehydration

Reptiles can present dehydrated for a variety of reasons, including anorexia, haemorrhage, diarrhoea, vomiting or water deprivation.

Skin tenting and dullness of the corneas can be used to assess the degree of dehydration, in a similar fashion to that described for small mammals.

Fluid requirements

Reptiles differ from the animals discussed already in that they naturally try to conserve water. Reptiles lose very little water through the skin, unlike amphibians, whose skin is semi-permeable. The main difference between reptiles and mammals is that reptiles excrete uric acid instead of urea, because uric acid can be excreted with only a small amount of water. Maintenance requirements for reptiles vary between 10-50ml/kg/day for different species. Initial fluid therapy is usually given at 25ml/kg/day (Girling and Raiti, 2004), reducing to 5-10ml/kg/day for maintenance.

Types of fluids used

Lactated Ringer’s solution can be administered to reptile species and is used for many problems, including metabolic acidosis and maintenance therapy. Some evidence suggests that isotonic fluids for reptiles should be 0.8 per cent rather than the 0.9 per cent used in cats and dogs. It is possible to convert standard fluids from 0.9 per cent to 0.8 per cent by either combining one-third of five per cent glucose saline, one third lactated Ringer’s and one-third sterile water. Alternatively, nine parts of five per cent glucose saline can be combined with one part of sterile water (Girling, 2003).

As with small mammals, blood transfusions are possible. Donor and recipient animals should belong to the same species. Up to 2ml/kg of blood can be taken from the healthy donor animal.

Route of administration

Before administering fluid therapy it is important that the patient has been warmed to the preferred body temperature and is kept within the preferred optimum temperature zone to ensure that the fluid will be absorbed. If possible, fluid can be given orally. Instead of using naso-oesophageal or naso-gastric tubes, pharyngostomy tubes tend to be used to reduce the stress of repeated handling.

Daily warm-water bathing of reptiles, such as tortoises, can encourage them to drink, eat and defecate. Also, some water may be absorbed across mucous membranes; for example, the cloaca.

The most commonly used parenteral route of fluid administration in reptiles and amphibians is intracoelomic, although care needs to be taken not to over perfuse, as high volumes of fluids can put pressure on the lungs - there is no diaphragm in reptiles or amphibians separating the body cavities. For this reason, it is recommended that no more than 20ml/kg be given in any one dose (Girling and Raiti, 2004).

It is possible to give small amounts of fluids subcutaneously, but other routes may be of more use. Intravascular access can be difficult in some reptiles, and usually requires a cut down, carried out under local anaesthetic, sedation and/or general anaesthesia.

Intraosseous fluid administration can be useful in lizards, in which the tibial crest or distal femur can be used, although great care needs to be taken to ensure sterility and the prevention of osteomyelitis. In the case of tortoises, the pillars of the shell that connect the carapace and plastron may be used for intraosseous fluids ( ). The equipment required for reptile fluid administration is similar to that already described for small mammals.

Birds

Causes of dehydration

Birds have a high metabolic rate and, therefore, a high demand for water. However, they are similar to reptiles in that they excrete protein waste products in the form of uric acid not urea, which requires less water for excretion. Therefore, maintenance fluid requirements of birds are similar to that of cats and dogs at 50ml/kg/day.

Reasons for fluid loss in birds include diarrhoea, regurgitation, ulcerative skin disease or surgery. A clinical assessment of the patient can help determine the degree of dehydration as shown in ·

Route of administration

Fluids can be given orally by crop tube ( ), subcutaneously, intravenously, or intraosseously. Advantages and disadvantages of each route are similar to those for cats and dogs.

Veins used for the administration of intravenous fluids include the basilica and ulnar veins in larger birds, the right jugular vein in most species and the medial metatarsal vein in waterfowl.

For intraosseous fluid administration the distal ulna and proximal tibiotarsus are the most commonly used. The femur and humerus should not be used as they connect to the air sacs so fluid administered via these bones may result in drowning.

Some examples of the volume of fluids that can be given are shown in ·

Types of fluids

Fluids such as lactated Ringer's or glucose saline are most commonly used in avian patients. Colloids and blood transfusions can be given to avian patients, although when dealing with very small species, such as budgerigars, the volumes of blood that can be transfused can be too small to practically deal with. The blood volume of a bird is 10 per cent of the bodyweight. If dealing with a budgie weighing 40g, this equates to 4ml. Further information on fluid therapy of exotic species can be found in the references.

References and further reading

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Figure 1. (inset) Tortoise receiving intraosseous fluids.

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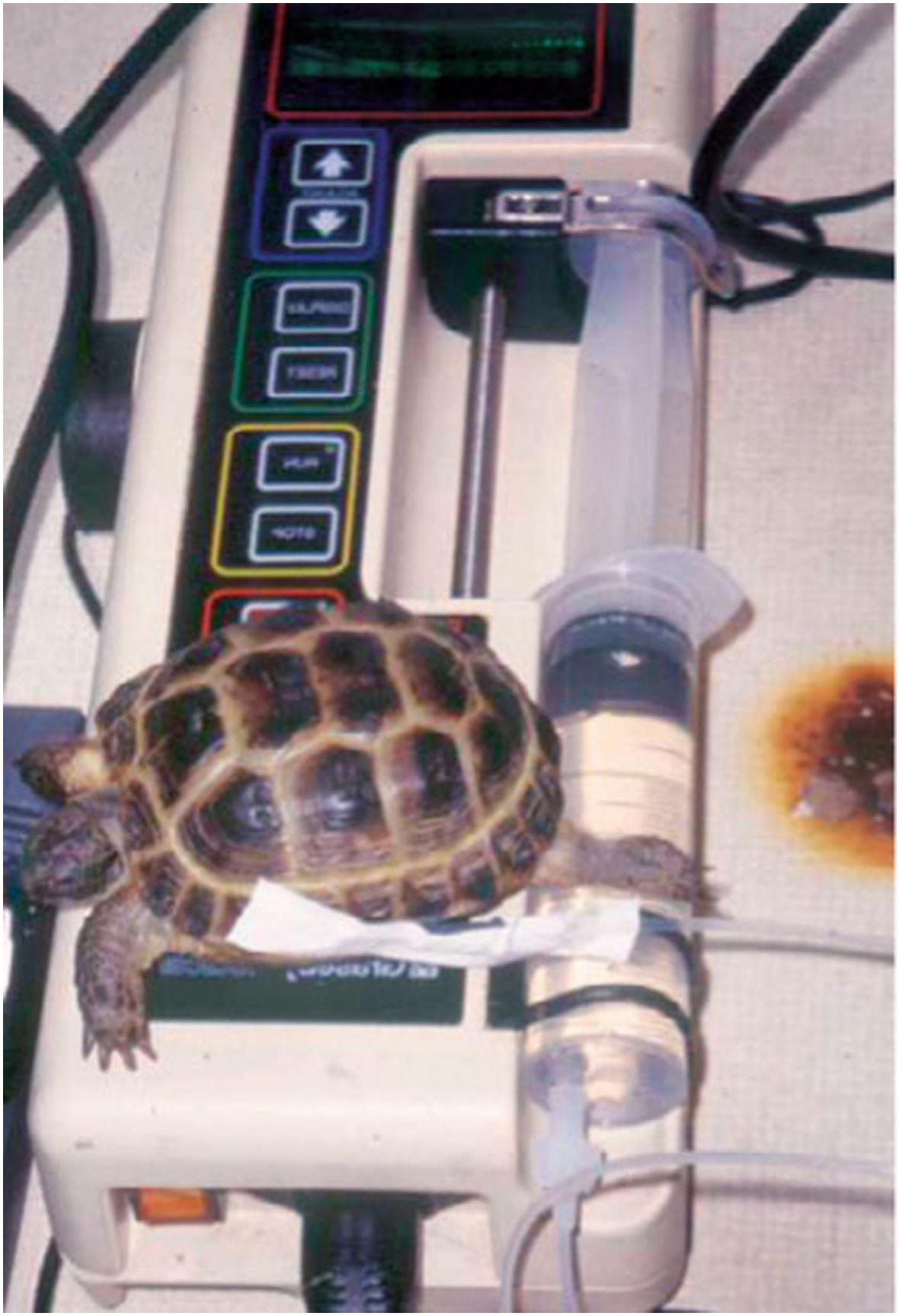

Figure 2. Fluid administration via crop tube.

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Species	Fluid maintenance values
Rabbits	80-100 ml/kg/day
Guinea-pigs	100ml/kg/day
Chinchillas	100ml/kg/day
Rodents	90-100 ml/kg/day
Ferrets	75-100 ml/kg/day

(Printed with permission, from Girling, 2003).

Table 1. Maintenance fluid requirements for small mammals

Percentage dehydration	Clinical findings
3-7 per cent	Tacky mucous membranes, lethargy
7-10 per cent	Skin tenting, dry mucous membranes, dull
10-15 per cent	Obvious skin tenting, skin doesn't return to normal, dull, comatose

(Adapted from Girling, 2003).

Table 2. Assessment of dehydration in small mammals

Percentage dehydration	Clinical findings
3-5 per cent	Increased thirst, slight lethargy, tacky mucous membranes, increased heart rate.
7-10 per cent	Increased thirst leading to anorexia, dullness, tenting of the skin and slower return to normal over eyelid or foot, dry mucous membranes, 'dull corneas', red or wrinkled skin in chicks, brachial vein refill time >2 seconds.
12-18 per cent	Dull-comatose, skin remains tented after pinching, desiccating mucous membranes, sunken eyes.
(Adapted from Girling, 2003).	

Table 3. Assessment of dehydration levels in birds

Species	Maximum volume given via crop tube
Budgerigar	0.5-1ml
Cockatiels	2.5-5mls
Conures	5-7mls
Cockatoos	10mls
African greys	8-10mls
Macaws	10-15mls

Table 4. Maximum volumes of fluid given via crop tube