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Online Veterinary Nurse and Technician Conference 2020

Avian Emergencies

Knowing how to effectively respond when presented with an avian patient emergency is vital. The majority of birds are prey animals so will instinctively hide any underlying diseases. This, combined with a poor public understanding of warning signs of ill health in these species, can mean that an animal may have been clinically 'normal' in the morning and within a few hours be in a critical state. Below I will outline how to provide CPR, how to monitor effectively, appropriate fluid rates, drug doses and access routes for these animals

In case of respiratory arrest:

If a bird goes into respiratory arrest, the first step is obtaining an airway. To intubate a bird, the beak must be held open by one person with a gag, length of gauze, or in smaller species, such a budgies or cockatiels, a length of suture material can also be useful. While the beak is being held open, the person intubating will be able to visualise the glottis at the base of the tongue, in the midline. If it is too far back to be easily accessed, a pair of gentle tweezers can be used to extend the tongue, move the glottis rostrally and easily insert the endotracheal tube a short way in. Some species have short tracheas, so inserting the ET tube too far can mean only one lung receives oxygen. As birds have complete tracheal rings, inflating the cuff can damage these so should always be left uncuffed.

In cases of suspected tracheal obstruction, an air sac cannula may be necessary to place. The air sacs that can be catheterised are the clavicular, abdominal or caudal thoracic air sacs. To place the cannula, a stab incision is made in the skin over the desired air sac .The underlying muscle is dissected with a pair of haemostats, then an endotracheal tube may be inserted at a depth of 4-5mm and then sutured in place. It should be remembered that anaesthetised birds will require IPPV if they have an air sac cannula.

A less ideal option is a tight-fitting face mask applied over the nostrils. IPPV should be provided at a rate of 2-3 times per minute with 100% oxygen. Ideally the patient should be attached to a mechanical ventilator using a pressure of no more than 10-15cm H20. If no ventilator is available, then manual bagging can be used, however care should be taken not to overinflate the lungs. There should be only enough pressure to gentle rise the bird's ribcage slightly.

IV or IO access should be obtained for drug administration.

Intravenous access sites are the jugular vein (in most birds the right is larger than the left, except in some birds, e.g. the Eclectus parrot), the medial metatarsal vein) or the ulna vein.

Jugular veins can be accessed midway up the neck; in the apteria (featherless tract).it is often very mobile and more dorsally located than in mammals. This vein can be tricky to access in small birds if they are conscious so sedation or anaesthesia may be required. The site should be held off well after the injection.

The medial metatarsal vein is the preferred vein in waterbirds and chickens as it is quite large, non-mobile and unlikely to blow due to the skin being tightly adhered over the top. The vein runs up the groove proximal to the hallux (just above the 'thumb').

The ulna vein is less commonly used as it is quite small and blows easily. This vein runs over the ulna bone, at the 'elbow'. Once the needle has been removed from the vein, pressure should be applied for at least 30 seconds, to reduce the likelihood of bleeding and subsequent bruising.

A Birds total blood volume is approximately 10% of their body weight and will start to become anaemic if more than 1% of bird's body weight in blood is lost. This means a 30gram budgie will have a total blood volume of 3mls and losing more than 0.3mls may lead to anaemia and potential death. Once pressure is taken off the injection site, the bird should be watched for a few minutes to ensure that it does not start bleeding again once the bird starts to move around.

Intravenous catheterisation

An intravenous catheter should be placed to allow administration of emergency drugs if required and to provide intraoperative fluid therapy. This catheter can either be placed in the ulnar vein, or in the medial metatarsal vein, which can be quite large in the seabirds and poultry. The ulnar vein runs across the antebrachium (Dube, 2011) while the medial metatarsal vein can be accessed in the groove just proximal to the hallux or accessory metatarsal.

To insert a catheter in the medial metatarsal vein, the area should have a light aseptic clean performed. Care should be taken not to remove too many feathers and to use minimal scrubbing

(especially methylated spirits) to reduce any heat lost via this area. Access to this vein is blind in most birds but easy to catheterise with a 22-24-gauge IV catheter (depending on the size of the bird) for the reasons previously mentioned. Once the catheter has been inserted, it can have an injection port, T-port or extension line attached and taped in place. IV catheters are generally well tolerated in most birds; however, parrots are likely to chew them out given a chance.

Intraosseous access site

In cases where intravenous access is not possible, e.g. the bird is very small, or all the veins have blown due to poor technique or a coagulopathy etc., intraosseous routes may be required. Accessing this site is painful, so should only be performed whilst the bird is under anaesthetic or unconscious in an emergency.

The easiest bone for this procedure is the proximal tibiotarsus; however, the distal or proximal ulna can also be used. The long bones, such as the humerus should never be used, as they have a diverticulum of the clavicular air sac within them. These pneumatized bones are a physiological adaptation to reduce their body weight for flight. This does mean, however, that any fluid or medication injected into these bones will enter directly into the air sac and drown the bird.

To gain access, the chosen site should be plucked of hair and aseptically prepared with chlorhexidine and water (no methylated spirits, for reasons mentioned earlier). This step is vital because if bacteria enter the bone, it can cause osteomyelitis, an infection of the bone.

A spinal needle or hypodermic needle of appropriate size is selected. The second largest that will fit within your selected bone is best (this will be explained later). The end of the chosen bone should be palpated to feel for the depression between the two condyles (rounded protuberances at the end of the bone); this is the insertion site.

With one hand stabilising the bone, the other hand should insert the needle into the depression and gently twist and push into a small 'pop' is felt. The needle will then easily advance into the medullary cavity of the bone. To ensure the needle is within the bone, the needle can be gently wiggled from side to side, and you should be able to feel it touching either side of the bone. If the needle has not entered the medullary cavity correctly, you will feel the side of the needle pushing out through the skin and muscle layer from the outside with you holding hand. If this is the case, the needle should be removed and replaced.

If using a hypodermic needle and you have confirmed that the needle is correctly positioned, it needs to be replaced with a slightly larger gauge needle. This is because the current needle will be blocked with bone material and so will not flush efficiently. If it is replaced with a needle of the same size, it is likely to leak at the insertion site, so a needle of one gauge larger should be chosen. To replace the needle, it should be gently removed, and the new needle placed within the same entry hole at the same angle. If using a spinal needle, they do not experience the same blocking issues, so do not require replacing.

The needle now needs to be plugged off with an injection site and sutured in, using tape and anchoring sutures. If this intraosseous catheter is to be left in place for a period of time, it will need to be bandaged to immobilise the limb and to prevent self-removal by the bird.

Parrots are unlikely to tolerate an intraosseous catheter once they are conscious, so this should be taken into consideration.

In case of cardiac arrest:

If cardiac arrest is suspected, cardiac massage should be commenced immediately for the best chances of success. This is performed by firm and rapid digital pressure on the sternum, or if the bird is over 350g, direct cardiac massage using a finger through an abdominal incision can be attempted (both techniques should be at a rate of 100bpm).Once cardiac compressions have commenced, an airway should be obtained, then IV or IO access as per in the case of respiratory arrest. Narcotics or analgesics should be reversed with Naloxone if applicable. The patient's body temperature should be maintained at its PBT for the best chance of success of CPR. If CPR is successful, check the patient's blood pressure and correct any fluid deficits. The best indicator of success of compressions is the end tidal co2 reading. ETCO2 values should rise to 10-15mmHg with each compression for them to be effectively massaging the heart. ECG can also be helpful, however remember that some electrical activity will be present, so a clear trace is required for an indication of a heartbeat. If CPR is successful, the reflexes will slowly return.

Monitoring:

Capnography readers are attached to the endotracheal tube, which can then be attached to the anaesthetic circuit. End-tidal Carbon Dioxide (ETCo2) levels for birds should be between 30-45mmHg

To attach ECG leads the red lead is attached to the crural fold of the left leg, the white lead is attached to the right propatagium or over the brachial vein and the black lead is attached to the left propatagium or over the left brachial vein. Alligator clips will be too traumatic to clip directly onto the patient, so they can either be filed down or can be clipped onto hypodermic needles that are then inserted into the skin. The best option however is sticky dots that alligator clips can attach to as they are less likely to attach during vigorous cardiac compressions.

SPO2 readers can be attached to any skin fold or the feet, however, pulse oximetry should be used with caution; these machines were developed with mammalian haemoglobin in mind, so will read inaccurately owing to the differences between mammalian and avian haemoglobin. Because of this, oxygen saturation readings should not be relied on in terms of values but can still be valuable when used as trends in conjunction with other monitoring parameters.

Fluids:

Maintenance fluids for most birds is 50mls/kg/day of lactated ringer's solution, but fluid deficits need to be considered on top of this. Fluid deficits can be assessed using either clinical signs or more ideally via a PCV/TP reading.

Clinical signs of dehydration in a bird are

3-5% dehydrated-increased thirst, slight lethargy, tacky mucous membranes and an increased heart rate.

7-10% dehydrated-increased thirst leading to anorexia, dullness, tenting of the skin and slower return to normal over the eyelid of foot, dry mucous membranes, dull corneas, red wrinkled skin in skins, refill time of the basilic vein exceeds two seconds and

12-18% dehydrated-dull comatose, skin remains tented after pinching, desiccating mucous membranes and sunken eyes (Girling,2013). A more accurate analysis of dehydration is by interpreting PCV/TP readings. An increase of PCV by 1%, with a similar increase in TP, equates to a need to replace 10ml/kg of fluid.

Normal PCV/TP values

Species	PCV	TP
Budgerigar	45-57%	20-30g/L
Amazon parrot	41-53%	33-53g/L
Macaw	43-54%	25-44g/L
cockatoo	42-54%	28-43g/L
cockatiel	43-57%	31-44g/L
chicken	24-43%	33-55g/L
pigeon	36-48%	21-35g/L
Barn owl	42-51%	29-48g/L

Girling,2016

To avoid fluid overload issues, the fluid deficit replacement should be spread out over two days, e.g. day one- maintenance rates + 50% of fluid replacement requirements, day two- maintenance rates + 50% of fluid deficit replacements.

If the patient is hypotensive a bolus of 3-5ml/kg of 7.5% of hypertonic saline should be given and the blood pressure remeasured. If there is no improvement this bolus can be readministered.

Normal systolic values for birds anaesthetised under isoflurane and sevoflurane is 90-150mmHg, however most oscillometric devices do not measure these values accurately, so trends should be monitored more than values.

Some commonly used emergency drug doses for avian patients are listed below.

Drug/concentration	**Dose rate (mg/kg)**	**Body wt.=50g**	**Body wt.=75g**	**Body wt.=100g**	**Body wt.=150g**	**Body wt. 200g**
Adrenaline (1:1000) 1mg/ml	0.5-1mg IV IC	0.025mg - 0.05mg (0.025ml-0.05ml)	0.037mg-0.075mg (0.037ml-0.075ml)	0.05mg-0.1mg (0.05ml-0.1ml)	0.075mg-0.15mg (0.075ml-0.15ml)	0.1mg-0.2mg (0.1ml-0.2ml)
Atropine 0.54mg/ml	0.5mg IV IM SC	0.025mg (0.046ml)	0.037mg (0.069ml)	0.05mg (0.09ml)	0.075mg (0.13ml)	0.1mg (0.18ml)
Doxopram 20mg/ml	7mg IM IV	0.35mg (0.017ml)	0.525mg (0.026ml)	0.7mg (0.035ml)	1.05mg (0.05ml)	1.4mg (0.07ml)