Stabilizing the Avian Trauma Patient

Jennifer Graham, DVM, DABVP (Avian / Exotic Companion Mammal), DACZM
Associate Professor of Zoological Companion Animal Medicine
Cummings School of Veterinary Medicine at Tufts University
200 Westboro Road
North Grafton, MA, 01536
Phone: 508-839-5395
Fax: 508-839-7942
Jennifer.Graham@tufts.edu

Because birds are prey species, they hide their signs of illness to avoid predation. As such, most birds presenting in an emergency have significant underlying disease. The exception to this rule can be cases of acute trauma. This presentation will overview the approach and decision-making process for avian trauma patients. Essentials of initial history taking, physical examination, and stabilization will be discussed along with common stabilization procedures.

Keywords: Critical care, avian, emergency, trauma, psittacine bird

Triage

Before taking a complete history, determine if the bird needs immediate care. As in mammals, the ABCs (airway, breathing, cardiovascular status) should be immediately assessed in avian patients with trauma. Stabilization efforts should be made in situations of hemorrhage, respiratory distress, severe neurologic signs including seizures, open fractures, or if the bird is weak and/or on the bottom of the enclosure. If immediate care is needed, the bird should be placed in a warm and oxygenated incubator, ideally 85-90°F. Supportive care measures including fluids, nutritional support, analgesics, or

antibiotic therapy can stabilize the patient and allow for additional diagnostics and treatment later.

History

If the trauma patient is stable, a thorough history can be taken and is a bit like detective work. Because many of the disease problems seen in exotic species are related to inappropriate diet or husbandry, essential history taking is crucial. Although traumatic injuries may be acute with minimal preceding history, there may be underlying contributing factors that become apparent after a complete history is taken. Important questions to ask include age, sex of bird, source of bird, duration and description of presentation, other pets in the environment, including any exposure to other birds. Keep in mind that owners may be calling their bird a male or female but unless it is a dimorphic species or has been DNA-sexed, the gender they state for the patient may not be accurate. A thorough diet history should be taken. In addition to finding out what is offered to the bird, take specific note of what the bird actual eats. For example, even if an owner states they are providing a formulated pelleted diet, the bird could be consuming primarily seed or human food if those are offered as well. Inquire about any recent changes in food or water consumption. Reproductive history including any egg laying or reproductive behavior is important; again, keeping in mind that owners may not realize reproductive behaviors as such. As a rule, psittacine bird droppings should not have an odor – ask about any changes in the droppings, including presence of any odor. Ask about any potential toxin exposure – this could include inhaled toxins, heavy metals, plant toxins, and cleaning products. If the bird's cage has been brought in, take note of

perch arrangement, diet, and overall cleanliness of the cage. Otherwise, make sure to get a good idea of the bird's caging and environment. Another important point is if the bird is allowed unsupervised time outside of the cage.

Examination

Prior to handling the bird, examine it in its cage. Evaluate how well the bird can move about the enclosure, body position, respiratory effort (open beak breathing or tail-bobbing can be signs of increased respiratory effort), if the feathers are fluffed, and overall level of responsiveness. Take note of color and consistency of droppings, any regurgitated material, and the presence of any blood or discharge.

Physical examination is best performed systematically, thoroughly, and in a timely fashion to minimize stress to the patient. Have all materials, including any needed for the exam or diagnostics, organized prior to handling the bird. Work in a small room with locking doors and covered windows to minimize the potential for additional trauma with any escapes. Darkening the room can reduce movement of particularly fractious patients to facilitate initial capture. A scale that weighs in 1-gram increments should be used to determine the weight of the patient prior to or immediately following the exam. Some birds will willingly step onto a tared perch, but some birds may need to be placed in a small container for weighing.

Evaluation of the head should include examination of the external ear canals, nares, eyes and surrounding tissues, beak, and the oral cavity including choanal slit. The beak is a common sight for trauma and should be closely inspected for cracks or bleeding. Head trauma can result in ocular trauma, hemorrhage, or bruising. Palpate the

crop at the base of the neck and note any distention or evidence of wounds. Body condition should be assessed by palpation of the pectoral muscling and palpation of the body for any excess fat stores. The coelom should be concave – any distention could be a sign of reproductive disease, obesity, organomegaly, or other masses. Wings and legs should be evaluated along with the overall quality of the skin and feathers. The presence of a wing or leg droop warrants further investigation. Evaluate the cloaca and perform a cloacal eversion in larger species to evaluate for any abnormalities including papillomas. Check the feet for signs of pododermatitis or overgrown/injured nails. Auscultation of the heart is best performed over the keel while the respiratory tract can best be ausculted across the back. Note any heart murmur, arrhythmias, or increased respiratory sounds. Any crackles, wheezes, or clicking can indicate pathology as respiratory sounds are normally minimal. Note that there can be a normal clicking sound in some birds from the uncinate processes (projections off the caudal aspect of each rib) hitting one another – this is most common in cockatiels in the author's experience. Bite wounds can result in subcutaneous emphysema and a crackling sound may be detected if this is present along with crepitus when palpating the skin. Skin turgor can be assessed by gently pinching the eyelids – if the skin stays tented this can be a sign of dehydration. The oral cavity can be dry and pigmented in many species so evaluation of the cloacal mucosa can give a better idea of mucous membrane color and hydration. Perfusion status can be assessed by refill time of the basilic vein. Complete neurologic examination can be challenging in some patients but should be attempted for any bird with suspected neurologic disease or head trauma. At any point in time a stressed bird can be given a break or placed in oxygen with the remainder of the exam completed later. Evaluate the recovery of the bird and note

excessive recovery time, dyspnea, or weakness. Overweight birds can easily get overheated and may display panting and holding the wings away from their body to facilitate cooling during recovery.

Stabilization Procedures

Hemorrhage control: Stop active hemorrhage with compression. Pressure wrap application (avoid pressure on keel) can be used. Silver nitrate or cautery can be used on bleeding nail. Broken blood feathers should be pulled with pressure applied to follicle. Hemostatic matrix or emergency surgery may be needed in some cases of hemorrhage.

Subcutaneous fluids: Although not appropriate for critical patients, subcutaneous (SQ) fluids can be helpful for stable dehydrated birds or patients with minor blood loss, such as that associated with a broken blood feather or minor trauma. Subcutaneous spaces are found in inguinal, axillary, and dorsal regions. The inguinal region is the preferred site for administration of SQ fluids in the bird. The patient should be restrained upright or in dorsal recumbency (if no coelomic pathology) with the legs pulled down. A small amount of alcohol can be applied to the medial side of the most proximal portion of the leg where the top of the leg meets the body to part the feathers. Using a small gauge needle or butterfly catheter, administer fluids into the visible skin fold making sure a 'bubble' forms, indicating the fluids are in the subcutaneous space. Although the same thing can be done in the axillary and dorsal regions, there is more risk with these fluid administration sites and less fluid can be administered. Wing flapping is likely with fluids administered in the axillary region and dorsal administration has a higher risk of

penetrating into an air sac or lungs. Care should be taken if administering fluids when penetrating bite wounds are present to avoid flooding the air sacs.

Intravenous catheterization: Intravenous catheters are more difficult to maintain than intraosseous catheters due to the thin skin of the bird. Locations for intravenous catheters include the jugular vein, basilic (or ulnar) vein, or the medial metatarsal vein. The area for catheter placement is plucked and scrubbed. A small catheter (generally 24- to 26- gauge over-the-needle catheter) is guided into the vein and secured to the skin with glue or tape sutured to the skin. A figure-of-8 bandage can be used to protect and secure basilic vein catheters. A neck wrap can be used to help secure jugular catheters. It is difficult to use the medial metatarsal vein other than for anesthesia since securing this catheter in place is more challenging due to the distal location on the foot in most psittacine birds. A syringe pump or fluid pump that can administer small volumes is ideal to control slow delivery of fluids.

Intraosseous catheterization: Intraosseous catheters can be placed either in the ulna or the tibiotarsal crest. A major complication of IO catheters is osteomyelitis; therefore, sterile surgical preparation of the area is essential. Placement can be performed in an anesthetized bird or with a local block in severely debilitated birds. After the area is plucked and scrubbed, a local block of 2% lidocaine diluted with saline can be used to numb the area. The dose used can be up to 0.2mg/100g bird. Medium to large sized birds will use a 20 to 22 gauge 1.5 to 2.5-inch spinal needle. A 25-gauge hypodermic needle can be used in smaller birds. A stylet can be made for the hypodermic needle using sterile cerclage wire or 3-0 to 6-0 stainless steel suture. Stylets prevent obstruction of the needle lumen with cortical bone.

Air sac cannula: Air sac cannulas are prudent for emergency stabilization of birds with suspected upper airway obstructions. Clinical signs of birds with upper airway obstruction include open mouth breathing, acute dyspnea, breathing with exaggerated whole-body movements, gasping with neck stretching and, in some instances, making squeaking sounds with inspiration. Air sac cannulas can be placed in either the caudal thoracic or abdominal air sacs. Cannulas can be made using modified red rubber catheters or modified endotracheal tubes by cutting to the appropriate length. The diameter of the tube is selected based on the approximate size of the trachea in the species. However more conveniently, avian air sac surgical catheters with retention discs can be used that allow ease of suturing to the skin.

B*andages*: The figure-of-eight bandage can be useful to manage wing fractures distal to the humerus, soft tissue injuries, luxations, or when the wing needs to be stabilized to hold a catheter in place. Soft roll gauze is used for the first layer and this is covered by self-adherent bandage material. If there is a humeral or pectoral girdle fracture, a body wrap should be placed. When placing a body wrap, care should be taken not to place excessive tension directly over the keel as this constricts breathing. The body wrap should be in position over the keel so that no pressure is placed over the crop or coelomic cavity, or movement of the legs is affected. A modified Robert-Jones bandage (birds > 200g) or Altman tape splint (birds (<200g) can be used to stabilize fractures distal to the femur. Once the bandage is in place the bird should be monitored to make sure there is no evidence of increased stress, dyspnea, or chewing/destroying the bandage. Enforcing layers can be placed over the bandage or an e-collar can be used to prevent damage to the bandage.

Patient support

Fluid therapy: Fluid therapy is a vital component of normalizing blood volume and restoring tissue perfusion in cases of shock. Crystalloids are the preferred treatment for avian dehydration. The fluid deficit equals the degree of dehydration (%) multiplied by the body weight in grams. Fluid deficit can be replaced over 6-8 hours in acute losses and over 12-24 hours in chronic losses in birds without cardiopulmonary compromise. Up to 50 mL/kg can be administered as an IV bolus. Recommended maintenance dose of fluids is 50-150 mL/kg/day (depending on species). If early decompensatory phase (blood loss greater than 25-30% of total blood volume), give crystalloid bolus (10 mL/kg) and HES bolus (hydroxyethyl starch, 3-5 mL/kg IV or IO). In decompensatory phase (LD_{50} of ducks was 60% of blood volume), give HSS bolus (hypertonic saline, 3-5 mL/kg IV or IO) over 10 minutes +/- HES (3 mL/kg IV or IO); warm patient and administer crystalloids (10 mL/kg) and HES (3-5 mL/kg) bolus IV or IO. Repeat for 3-4 boluses or until blood pressure is greater than 90 mm/Hg. If PCV <20% consider blood transfusion.

Wound management: If surgical debridement is performed within 24 hours of a bird sustaining a severe injury, the patient may be placed at unnecessary risk. The level of tissue damage and surgical risk can usually be assessed within 24 hours post-injury. Initial wound cleaning, minor debridement, and temporary wound dressing may be preferable to aggressive surgical debridement to allow for patient stabilization. Severed tendons, major nerves, or ligaments should be re-anastomosed as soon as possible as tissue contraction can complicate repair. Coelomic penetration may require surgical exploration. Primary closure of wounds is indicated for stable birds presented within 6-8

hours of trauma with minimal contamination and tissue trauma. Delayed primary closure is indicated for most acute wounds healthy enough for closure within 3-5 days of wound management with hydrophilic dressings. Secondary closure or second-intention healing of wounds is indicated for extensive wounds requiring wound management for longer periods. These wounds can be closed once a healthy bed of granulation tissue is present or left to heal by second intention. Wound healing time is 10-14 days for skin healing in most avian patients.

Intensive care environment: If a bird is showing severe signs of respiratory distress, the patient should immediately be placed in an oxygen-enriched environment. Severely dyspneic birds do not tolerate handling, and an oxygen cage with 35% to 50% oxygen level is preferable to oxygen delivered by a facemask. A low dose of a sedative may reduce some of the stress associated with upper airway obstruction in the avian patient while preparing for placement of an air sac cannula. Commercially manufactured intensive care units for birds can provide oxygen, heat (85-90F), and humidity (70%) and are helpful in emergency situations.

Blood transfusion: If PCV < 20% and blood loss is acute (i.e., patient not compensated), consider whole blood transfusion. Calculate patient's total blood volume (8% of body weight) and replace 10% of the blood volume IV or IO.

Analgesia: Butorphanol is commonly used in avian patients at 1-4 mg/kg q1-4h. Meloxicam is a commonly used NSAID at 1-2 mg/kg q12h (ranges listed depend on species). Oral bioavailability of tramadol was higher in avian species compared to humans or dogs. Although this drug is used clinically in caged birds and shows great promise, further investigation is needed to determine appropriate dosing, efficacy, and

safety among different species. Gabapentin has been used as part of a multimodal plan for suspected neuropathic pain in birds. In 3 reports, self-mutilation appeared decreased after the addition of gabapentin to the therapeutic regimen.

Antibiotics: Topical antiseptics (0.05% chlorhexidine, 1% povidone iodine, 3% hydrogen peroxide), or topical antimicrobials can be used; silver sulfadiazine promotes epithelialization, penetrates necrotic tissue, but may impede wound contraction. Avoid oil-based ointments as they can inhibit normal thermoregulatory functions when preened into feathers. Systemic antibiotics should be chosen based on need for aerobic and anaerobic bacterial coverage. Important considerations include the ability of the antibiotic to reach the wound at appropriate concentrations, bacterial resistance patterns, PK data, and patient status. Some examples of commonly used antibiotics include: amoxicillin-clavulanic acid 125 mg/kg PO q12h for stable patients, piperacillin 100-200 mg/kg IM/IV q4-12h for unstable patients.

Nutritional support: Ingluvial gavage is indicated for avian patients that are not eating to assist in daily caloric intake. Nonpasserine basal metabolic rate (BMR) kcal/day = 73.5 x $kg^{0.734}$. Maintenance requirements = 1.5 x BMR; adjust for stress by the following multiples of maintenance emergency requirements as follows: Starvation: 0.5-0.7, elective surgery: 1.0-1.2, mild trauma: 1.0-1.2, severe trauma: 1.1-2.0, growth: 1.5-3.0, sepsis: 1.2-7.5, burns: 1.2-2.0, head injuries: 1.0-2.0.

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