Techniques for Drug Delivery in Psittacine Birds

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Abstract

Psittacine birds are challenging to medicate, because they can deliver a painful bite and can learn to resist drug administration. Some drug delivery systems require restraint or sedation for placement, which may not be tolerated by critically ill birds. In this article, drug-delivery strategies will be discussed regarding psittacine species, including the benefits and risks of each method as well as practical guidance based on the experience of this and other authors.

Key words: **Psittacines; avian; therapeutics; drug delivery routes; medication administration; intravenous; intraosseous; per os; nutritional support; fluid therapy**

Psittacine birds pose inherent challenges for drug delivery. Most species can deliver a painful bite, if they are not keen on being medicated. They can become fearful of being approached, if there is a perception that an unpleasant experience is about to occur. These birds are intelligent and can quickly find ways of removing catheters and bandages, thwarting efforts to deliver therapeutics. Critically ill birds cannot tolerate prolonged restraint or sedation required for placement of some drug-delivery systems. The clinician must evaluate the status of the patient, as well as the frequency and route of delivery of a therapeutic to determine the best method of drug delivery to the bird.

Oral Medication Strategies

Per Os Administration

Per os administration of a drug in fluid form is the most direct method of oral delivery that can be performed in the home environment. Some birds will readily accept flavored liquid medications. Many therapeutics are not commercially available in this form and require compounding. Despite adequate palatability, most birds need to be captured and restrained for treatment, which can be stressful and lead to injury and distrust.[1] If medications are delivered too quickly or inappropriately, aspiration into the trachea and/or choana will occur. Larger dosing volumes are more likely to be aspirated.[1] Birds can refuse to swallow or collect the liquid in the lower beak, or can regurgitate immediately after administration. Medications can also be delivered by tube feeding (see Routes of Alimentation) in the hospital setting.

Application of Medications in the Food

Direct oral administration can be stressful and time consuming for large groups of birds. Some owners are not capable of administering oral medications to their bird. For medicated feed to be effective, the drug must be stable in the food for the length of

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time provided to the bird, homogeneously mixed, and consumed in a predictable quantity. Sick birds are less likely to eat, whereas young or reproductively active birds may consume larger quantities. Birds are often resistant to dietary changes, particularly when ill.[1] Extralabel use of medicated feeds in minor species has been prohibited by the Federal Food, Drug, and Cosmetic Act. In 2001, the Food and Drug Administration–Center for Veterinary Medicine issued a Compliance Policy Guide that details instances in which extralabel use of medicated feed will not result in regulatory action.[2] This document should be read carefully by practitioners treating birds with this method. Doxycycline delivered at 250 to 300 parts per million in hulled seed diet was shown to maintain therapeutic plasma concentrations for the treatment of chlamydiosis in budgerigars (*Melopsittacus undulatus*).[3] Medi-Berries (Lafeber Company, Cornell, IL USA) are absorbent hulled seed balls to which liquid medication can be coated or injected. They can be used to attempt oral delivery without restraint.

Application of Medications in the Drinking Water

Drugs delivered in the drinking water must be stable for the time offered to the patient. Ambient temperature or exposure to sunlight may alter drug stability. Changes in temperature, humidity, and diet could alter water consumption by birds.[4] Plasma concentrations of doxycyline delivered in the drinking water at 800 mg/L to African gray parrots (*Psittacus erithacus timneh*) and Goffin's cockatoos (*Cacatua goffini*),[4] and to cockatiels (*Nymphicus hollandicus*) at 280 and 830 mg/L,[5] were considered within the therapeutic range for the treatment of chlamydiosis, but failed to achieve effective plasma concentrations when offered to budgerigars at 50 to 400 mg/L.[3] One study reported that enrofloxacin-medicated water at 200 mg/L was only adequate enough to treat infections with highly susceptible bacteria in several psittacine species.[6]

Routes of Alimentation

Tube Feeding

If birds are reluctant or unable to eat on their own, they must be provided nutritional support. Guidelines for volume and frequency for delivery of nutritional formulas have been published.[7,8] The simplest method of force feeding is by crop infusion with a feeding tube (e.g., red rubber, stainless steel).[1,8-10] The largest tube that can be passed easily should be used so that the material can be delivered quickly, thereby decreasing the possibility of tube blockage. Using a tube that is at least as wide as the trachea minimizes the risk of inadvertent placement into the trachea. Rigid, ball-tipped metal tubes are easiest to pass but are more likely to cause esophageal and crop trauma.[10] All other treatments should be completed before tube feeding.[7] The crop should be palpated before feeding, and the residual volume should be taken into account when calculating infusion volumes.[7,8] A speculum or a plastic dog chew toy can be placed between the beaks when using a rubber feeding tube to avoid the tube from being severed and swallowed. The feeding tube should be lightly lubricated before insertion and guided down the esophagus on the right side of the neck (Fig 1).[8] After placement of the tube in the crop, the neck should be palpated for the presence of 2 tubes, the trachea and the feeding tube. As the material is infused, the oral cavity should be inspected.[8] The bird should be set down immediately if material appears within the oropharynx.[8]

Figure 1. Crop lavage (tube feeding) of a severe macaw (*Ara severa*). The tube is passed from the left oral cavity down the esophagus located on the right side of the neck. The neck is extended as much as possible.

Esophagostomy

Occasionally, it is necessary to bypass the oral cavity and crop, such as with cases of severe beak injury or crop burn. A technique for surgical placement of a proventricular feeding tube is thoroughly described by Tully.[1] An incision is made into the pre-crop esophagus, and a red rubber or other suitable feeding tube is directed past the crop and into the proventriculus. The tube can be sutured to the skin and