

Tracheal Foreign Body Removal in Small Birds

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Abstract: This presentation will review the occurrence of tracheal foreign bodies in cockatiels and other small birds. Appropriate steps for diagnosis and airway restoration will be discussed. Previously described techniques for foreign body removal will be reviewed, including endoscopic retrieval, tracheotomy, and a novel technique involving insertion of a 22-gauge needle for displacement and air-propulsion of the object out through the glottis. This presentation should have practical application for veterinarians of various avian medicine experience levels.

Introduction

Obstructive tracheal conditions occur with some regularity in avian patients. Causes reported in the literature include soft tissue swelling or proliferation secondary to trauma, fungal and bacterial infections, foreign bodies, parasites, and neoplasia.¹⁻⁶ Squamous metaplasia secondary to hypovitaminosis A is also recognized to cause impingement of the glottis, choana, and sinuses and may contribute to secondary bacterial or fungal infections of the trachea.² Swelling or enlargement of tissues surrounding the trachea, such as masses of the thyroid gland, can also impinge upon the trachea and cause dyspnea.¹ Inhalation of millet seeds by cockatiels appears to be commonly seen in clinical practice.^{2,3}

Birds which have inhaled foreign bodies often present with acute dyspnea. In addition, dysphonia, coughing, increased respiratory effort (tail bobbing and open-mouthed breathing) may be seen.^{4,7} There may be variations in degree of symptoms throughout the course of the problem due to shifting of the foreign body or due to increased mucus production, soft tissue swelling, or swelling of the foreign body. Birds with tracheal obstructive lesions, such as inhaled foreign bodies, will generally respond dramatically to the application of an air sac cannula and placement will allow the clinician to continue safely with evaluation and treatment.^{2,6} Techniques for air sac cannulation are previously described in the literature.^{5,6}

Diagnosis of a tracheal foreign body is supported by history of acute onset of respiratory symptoms.^{2,3,5,7} In addition, physical examination will generally demonstrate ongoing dyspnea with loss or change in voice. The bird may exhibit an inspiratory squeak.^{6,7} Further support can be obtained from radiographs, contrast radiography, computed-tomography (CT), magnetic resonance imaging (MRI), and transillumination of the trachea in small birds.³⁻⁷ Tracheoscopy is the most definitive method for confirmation of a tracheal foreign body.

The treatment for tracheal foreign bodies focuses upon removal and the prognosis is generally good if the object is removed.⁶ Described extraction methods (regardless of size of patient) include endoscopic manipulation, suction, tracheotomy, tracheal lavage, and driving the foreign body caudally through the syrinx and into the thoracic cavity using a probang.²⁻⁷ Complications from these procedures have included stenosis, permanent dysphonia, mycotic or bacterial infection, and hemorrhage.⁵⁻⁷

In small birds, such as cockatiels, lovebirds, and others weighing less than 150 g, confirmation and resolution of a tracheal foreign body are complicated by the small diameter of the trachea. Endoscopy is generally useful for

confirmation of a foreign body and endoscopic assisted removal has been described in a cockatiel (*Nymphicus hollandicus*). However, depending upon available equipment and the size of the bird, simultaneous endoscopic visualization and use of instruments within the trachea may not be possible. Tracheotomy has been described for the removal of tracheal foreign bodies.⁷⁻⁹ Postoperative tracheal stenosis is a potential complication, although this can be minimized by confining incisions to the spaces between tracheal rings and by using fewer sutures with the knots placed external to the lumen.⁷ Tracheotomy can be technically challenging particularly in small patients. Use of magnification and microinstrumentation are recommended.⁹ Because of these challenges, at least one author recommends use of tracheotomy only after all less invasive methods have been exhausted.⁸

One method of tracheal foreign body removal heretofore not described in the literature involves the use of a needle inserted into the trachea to dislodge and expulse a foreign body via the glottis. Use of a needle inserted transversely to prevent further migration of the foreign body caudally has been described.⁹ Expulsion is assisted by forceful air from an attached syringe or by repeated reinsertion of the needle to sequentially displace the object cranially.

Case Report

Between January 2005 and March 2007, the Medical Center for Birds saw 7861 avian patient accessions. Of these, 890 were cockatiels and 13 were birds under 160 g who presented with symptoms suggestive of tracheal obstructive disease. Of these 13 cases, this author attended 5 cases of confirmed foreign body tracheal obstruction in birds weighing 155 g or less. Species distribution was 4 cockatiels and a blue-crowned conure (*Aratinga acuticaudata*) and ages ranged from 5 to 21 years old. The transtracheal expulsion method described here was utilized by the author on 4 of these cases with 100% success.

In this case report, a 20-year-old male cockatiel (*Nymphicus hollandicus*) was admitted in an acute, severely dyspneic state. The bird had grossly audible crackles and wheezes on inspiration and expiration. The degree of congested breathing did not change when the beak was held open and there was no discharge from the nares, which supported that the origin of this bird's breathing problems was at or caudal to the glottis. The bird was maintained on a millet seed-based diet. The remainder of the physical examination was normal. Possible etiologies were discussed with the owner including an inhaled foreign body, tracheal trauma, neoplasia, and mycotic or bacterial disease of the respiratory tract. Anesthesia for air sac placement of a cannula was recommended for immediate relief of respiratory symptoms, followed by tracheoscopy and radiographs.

Anesthesia was induced utilizing a non-rebreathing gas anesthesia circuit and isoflurane 5% delivered by mask on an oxygen flow of 2 L/min. Once the bird was adequately anesthetized, air sac cannulation was accomplished in the left caudal thoracic air sac. The air sac cannula consisted of a 12-Fr (4.0-mm ID) red rubber tube (Sovereign Feeding Tube and Urethral Catheter, Tyco Healthcare Group, Mansfield, MA, USA) with side ports and cut so that it protruded about 2–3 cm from the skin. The bird was maintained on 1.5–3% isoflurane and 2 L/min oxygen flow. The bird was placed in dorsal recumbency and a Wolfe 1.8-mm rigid telescope (Richard Wolf GmbH, Knittlingen, Germany) was inserted via the glottis into the tracheal lumen. A yellowish smooth object was found in the caudal trachea. The scope was advanced so that it just rested against the object. A permanent marker was used to mark the skin over the tip of the scope, as identified by the spot of illumination externally apparent. The scope was removed and the skin over the marked area was plucked, aseptically prepared, and sterilely draped. A 2-cm incision was made down the ventral midline of the neck centered over the previously made ink mark. Blunt dissection was used to reflect the esophagus and crop, isolate the trachea, and free it up so that it could be gently retracted cranially and allow access to the site. The object could be seen through the translucent wall of the trachea.

A 22-gauge needle was then inserted between tracheal rings caudal to the foreign body. The needle was inserted into the tracheal lumen in a caudal-to-cranial direction at a shallow angle to the tracheal wall. The needle was advanced against the object to dislodge it cranially. Following this, a 12-ml syringe was connected to the needle and forceful air injection was used to propel the object up into the glottis. From here, the object was removed with forceps.

Once the object was successfully retrieved, the transtracheal needle was momentarily left in place while a second endoscopic assessment was made. The trachea cranial to the needle was found to be cleared of foreign material so the needle was removed and the remainder of the trachea inspected. No further foreign material was identified and there appeared to be only a mild degree of change, consisting of small amount of white mucoid covering, to the tracheal wall.

The skin over the site was closed with 6-0 (0.7 metric) Vicryl (Polyglactin 910 Suture, Ethicon, Inc, Somerville, NJ, USA) in a horizontal mattress pattern. No attempt was made to restore the cervicocephalic air sac. The air sac cannula was removed immediately and the skin over the cannulation site closed with a single simple horizontal mattress suture of 6-0 Vicryl. Recovery was rapid and the patient was found to breathe comfortably.

Upon gross inspection, the foreign object closely resembled a millet seed. In-house cytology of impression smears from the object revealed plant material with no significant fungi or bacteria. A culture of the material was declined for financial reasons in this particular case.

The patient was discharged the day following surgery and given ciprofloxacin (10 mg/ml compounded solution from ciprofloxacin tablet, Ranbaxy Pharmaceuticals, Inc, Jacksonville, FL, USA) at 20 mg/kg q12h x 10d and meloxicam (Metacam, Boehringer Ingelheim Vetmedica, Inc, St. Joseph, MO, USA) at 0.4 mg/kg q12h x 5d. Rechecks at 1 and 2 weeks demonstrated normal breathing and good weight maintenance. Instructions and demonstration was used to train the owner on changing the bird's diet to formulated pellets and vegetables, which in this case was successfully followed.

Discussion

In addressing tracheal obstructive disease, this author's priorities are to establish a patent airway (generally with the use of an air sac cannula), establish a presumptive diagnosis (based upon physical exam and history), establish a diagnosis (generally through the use of tracheoscopy), and then to proceed from least to most invasive technique in the removal of foreign bodies. Selection of a technique will depend upon available equipment, size of the patient, skill and experience of the surgeon, and the nature of the foreign body. The first 3 challenges are perhaps the most limiting: if the endoscopy equipment and experience is not available in-house or by referral, then endoscopic resolution is not possible and other technique needs to be considered. For example, in the case illustrated here, endoscopic retrieval could not be accomplished because the small size of the bird's trachea could not accommodate the available endoscope and instruments simultaneously. The softness, shape, and how tightly the object is wedged into the trachea will also dictate removal technique. With hard, smooth objects such as inhaled seeds, grasping with endoscopy instruments may not be possible until the object softens. Also, the author has noted that objects can be tightly wedged within the trachea (particularly millet seeds in the trachea of a cockatiel) and require a moderate amount of force to dislodge. This amount of force could be very difficult to apply when grasping and pulling with endoscopic instruments, particularly when solid purchase on the object is difficult to achieve. One author has used a 1.2-mm semiflexible endoscope to retrieve a foreign body, piece by piece, in a cockatiel though it should be noted that this foreign body could only be removed after it had softened over a period of 4 days to allow grasping with endoscopic biopsy forceps.⁶

The author has varied the trans-tracheal technique slightly case-to-case. In 2 of the cases, a 25-gauge needle was inserted cross-wise caudal to the object to prevent further migration caudally. In cases where the inhaled foreign body was too far caudal to allow access caudal to the object with a needle, the object can be elevated to an accessible point with forceful positive pressure ventilation via an air sac cannula, as seen in at least one case treated by the author. One author has described use of gentle compression of the trachea to “milk” an object cranially for extraction via tracheotomy.⁷ This same technique could be used to elevate a foreign body for transtracheal needle access.

Once a needle is in place and the object has been forced cranially, an assistant should check the glottis and remove the foreign body once it is visible. Sometimes the object may be forced up into the choana and this region should be checked also. If a foreign body does not move readily with expulsion of air from the surgeon’s syringe, the anesthetist can assist by coordinating forceful positive pressure ventilation, via the air sac cannula, simultaneous to the surgeon’s forceful air injection. If this still does not succeed in moving the object, the needle can be advanced then removed and reinserted further cranially, gradually moving the object cranially in stages.

Once the object has been successfully retrieved, the needle should be momentarily left in place while a second endoscopic assessment is made. If the trachea cranial to the needle is clear, the needle is removed and the remainder of the trachea inspected. The process can be repeated if further foreign bodies are identified. Cultures, biopsies, or cytological specimens can also be collected if significant lesions are present.

Following removal of a tracheal foreign body, the veterinarian should consider the use of analgesics, non-steroidal anti-inflammatory drugs, antibiotics, and antifungal drugs, depending upon the severity of trauma to the trachea, perceived discomfort to the patient, culture or cytology results, and patient risk factors for bacterial or fungal infection. The decision to remove the air sac cannula is made based upon breathing ability and nature of the removed foreign body. For acute cases of inhaled foreign bodies, the cannula may often be removed immediately after clearing the obstruction. In cases where significant inflammation or fungal or mycotic lesions are present, the air sac cannula should probably remain in place while culture results are obtained and treatment is initiated. The cannula can be periodically blocked off to assess the patency of the trachea and the patient’s comfort level while breathing through it. Once a patient is breathing comfortably without the presence of an air sac cannula, they should be discharged. Owners should be counseled on the possibility of tracheal stricture formation within 1–2 weeks. Recheck appointments and client communication should be scheduled on a weekly basis for the following 2 or more weeks to monitor for the recurrence of respiratory symptoms.

The longest following time has been a month thus far with no apparent complications. Follow-up on these cases is still in progress and this information will be presented during the conference presentation.

Tracheal cut-down and transtracheal needle displacement of foreign bodies has become, for this author, another tool in the collection of techniques available for addressing tracheal foreign bodies. There will undoubtedly be cases where its use is not appropriate, particularly for objects that are too far caudal to allow access. In cases where all less invasive foreign body removal techniques have been eliminated, tracheotomy should be considered and is a viable option even in birds under 100 g in body weight. Tracheotomy is a challenging procedure in smaller birds but this author has accomplished the procedure successfully in birds as small as cockatiels.

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Table 1. Tracheal obstructive disease in small birds (BW < 160 g) 1/2005-3/2007.^a

Species	n	Diagnosis	n
<i>N. hollandicus</i>	11	Mycotic/bacterial infection	4
<i>A. acuticaudata</i>	1	Foreign body	5
<i>Streptopelia capicola</i>	1	Postoperative stenosis	2
		Undiagnosed	1

^a7861 total patient accessions between 1/2005-3/2007. Patient accessions can include multiple encounters with the same patient. 890 of these accessions were cockatiels, the patient most represented in tracheal obstructive disease of birds weighing less than 160 g.

Table 2. Small birds (BW < 160 g) with tracheal foreign bodies attended 1/2005 – 3/2007.

Species	Age (yrs)	Gender	Date	FB ^a	Treatment / Outcome ^b		
					Endo ^c	Asp ^d	TTR ^e
<i>N hollandicus</i>	6	M	8/22/2005	Seed	Y	Y	N ^f
<i>N hollandicus</i>	5	M	4/20/2006	Seed	Y	N	YS
<i>N hollandicus</i>	13	F	8/10/2006	Seed	Y	N	YS ^g
<i>N hollandicus</i>	20	M	10/28/2006	Seed	Y	N	YS
<i>A acuticaudata</i>	21	U	1/17/2007	UFB ^h	Y	Y	YS

^aFB = Foreign body type

^bTreatment/Outcome codes: Y = Yes (attempted), N = No (not attempted), S = Successful

^cEndo = Endoscopic evaluation and retrieval attempted.

^dAsp = Aspiration using a catheter attempted.

^eTT = Transtracheal removal attempted.

^fThis case predated the development of the transtracheal technique. Tracheotomy was recommended but declined by the owner and the bird was euthanized.

^gThis bird originally presented for chronic reproductive tract disease and a salpingohysterectomy and removal of laminated ova was performed. Five days later, the bird developed dyspnea which was initially believed to be due to mycotic or bacterial infection of the trachea (endoscopy revealed obstruction with yellowish mucus but no fungal or bacterial elements were identified cytologically or by culture). A few days later, 3 seeds were removed successfully from this bird's caudal trachea using the transtracheal technique. However, the patient died a short time later apparently from combined complications of tracheal disease, chronic air sac cannulation, and, possibly, salpingohysterectomy.

^hUFB = Unidentified foreign body. In this case, the item resembled a crumb of a pellet, which was consistent with the bird's diet.