Gastrointestinal Obstruction: a Review, its Diagnosis and Treatment

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INTRODUCTION

The avian gastrointestinal system has an anatomy designed for survival and efficiency to cope with all manner of ingested material. In particular, the koilin lining and powerful grinding action of the ventriculus means that many foreign bodies are ground up within a few days of ingestion (Doneley, 2011). However gastrointestinal foreign bodies and obstructions along the whole gastrointestinal system remain a common challenge for avian veterinarians to diagnose and treat. In birds, gastrointestinal obstruction can be extra-luminal as well as intra-luminal. Reports of objects causing Intra-luminal obstruction include stones and phytobezoars, sloughed koilin (Lumeij, 1994), string (Adamcak et al., 2000) and even polyacrylamide gel (Miller et al, 2009). This paper explores the challenges associated with the diagnosis and the treatment of gastrointestinal blockages. Cases of complete, partial, intra-luminal and extra-luminal blockage are used to illustrate challenges arising from anatomical differences between species, type and location of blockage.

CASE REVIEWS

Extra-luminal obstruction

Recently a budgerigar *(Melopsittacus undulatus)* presented with a large internal mass that create an extra-luminal partial obstruction of the gastrointestinal system. Large masses in the coelom of birds have been reported to cause disruption to the passage of faecal material (Gelis, 2006). Reported cases of extra-luminal obstruction in the literature include tumours and a syndrome where the bowel becomes occluded after passing through tears in the mesentery (Lumeij, 1994). Renal tumours in particular are reported as common in budgerigars (Echols, 2006) and may grow large enough to cause pressure and thus obstruction to the intestinal tract. The budgerigar in this case presented with an abdominal swelling, the passage of intermittent large droppings, weight loss and respiratory distress. Radiology was used to define a mass in the area of the ovaries. The owners declined additional blood testing in favour of a course of leuprorelin acetate 0.75mg/kg (Lucrin, Abbott) given every 14 days for three injections; with the chance this may be a hormonally responsive tumour on the ovaries. Signs of obstruction reduced and the bird improved with the treatment.

Fibrous Foreign bodies in the crop

One case of a cockatiel *(Nymphicus hollandicus)* with a fibrous foreign body in the crop was treated medically by the senior author. This bird had a history of depression and not eating well. Examination revealed a bird that was fluffed up, had low body condition and a small amount of food in the crop with no other significant findings. Initial tests indicated mild anaemia, severe hypoproteinaemia and inflammation with the presence of a toxic heterophilia. Radiographs revealed an enlarged liver. The crop wash showed the presence of budding yeasts. Faecal wet preparation demonstrated the absence of parasites and a Gram stain showed low numbers of bacteria mostly Gram-positive cocci. Treatment included crop feeding with a parrot rearing mix (Passwells granivore), amoxicillin/clavulonic acid 100mg/kg bid (Clavulox, Pfizer), enrofloxacin 10mg/kg bid (Baytril, Bayer), nystatin 300,000IU/kg bid (Nilstat, Sigma) and cisapride 1mg/kg bid(Cisapride, Compoundia). The bird showed slight improvement to the treatments. During hospitalisation the crop was noted to occasionally fail to empty, and there was always a small palpable substance in the crop. Blood tests were repeated five days later and showed resolution of the mild anaemia, hypoproteinaemia and inflammation. An Immunocomb (Laboratory Diagnostics) *Chlamydia* antibody test performed at this time was negative. The bird had periods of good but not complete response to treatments. Ten days after treatment commenced the cockatiel started vomiting small strands of fibre and suddenly became very depressed, the owner was concerned about further treatment and elected euthanasia. Unfortunately the owner declined necropsy.

A Silky bantam *(Gallus gallusdomesticus)* was also seen by the senior author earlier this year with a large phytobezoar in the crop. The fibrous mass developed over a period of time. The owners were aware the crop was large but had not realised that it was not emptying and brought the bird into the clinic when a reduced appetite and obvious weight loss was noted. Clinically, the crop was large and pendulous with a bulky, pliable mass within it. Initially a non-surgical technique of lavage and massage and treatment of secondary bacterial and yeast infection (diagnosed with samples from the crop lavage) was attempted. However the phytobezoar did not break down properly and perpetuated secondary ingluvitis. This case eventually went to surgery where an ingluviotomy was performed. A large fibrous mass of grass, much of which had now also extended into the proventriculus was removed. For some time after the surgery the chicken suffered from a pendulous crop with secondary yeast and bacteria requiring a crop bra and prolonged medical treatment.

Proventricular obstruction

A Gentoo penguin *(Pygoscelis papua)* started showing signs of depression, increased respiratory efforts and lack of interest in feeding. These signs worsened over a four day period after which radiographs revealed the bird had swallowed a very large rubber dumbbell-shaped toy (20 x 5-6cm). The toy had been used as part of an environmental enrichment program. Anaesthesia was induced with Isoflourane (Abbott) mask down after a premedication with medetomidine hydrochloride 0.3mg/kg (Domitor, Pfizer). A flexible endoscope was passed through the mouth into the proventriculus to permit endoscopic forceps to grasp the toy. The lack of crop and wide oesophagus in this species facilitated the use of endoscopy for retrieval. The penguin made a complete recovery.

Intestinal obstruction

A 12 year old Appleyard duck *(Anas platyrhynchos domesticus)* presented with weight loss and lack of appetite, mild lethargy and passing only urine and urates with no faecal component. Physical examination revealed a depressed duck with a soft bloating abdomen and an empty crop. Plain and contrast radiology revealed large loops of gaseous bowel with a large spherical radiodensity detected mid-abdomen. Clinical pathology indicated a hypoproteinaemia, a mild non-regenerative anemia and inflammatory leukogram. Initially the duck was treated medically with subcutaneous fluids and antibiotics, then crop feeding and cisapride 1mg/kg bid (Cisapride, Compoundia). Once the owners consented to surgery, the duck was placed on IV fluid (sodium chloride 0.9%) at surgical rates (10ml/kg/hour), anaesthetised with a combination of butophanol tartrate 2mg/kg (Torbugesic, Fort Dodge), medetomidine hydrochloride 0.6mg/kg (Domitor, Pfizer) and ketamine 5mg/kg (Ketamine, Parnell), injected intramuscularly. It was intubated with a size 2.5mm non-cuffed endotracheal tube, maintained on Isofluorane, and prepared for surgery. Using a ventral approach with lateral flaps on both sides, large loops of intestines were exposed and an intussusception was revealed. The intussusception did not reduce due to an impaction caused by the blockage. An enterotomy was performed to reduce the impaction. The impaction could only partially be removed but enough to allow the reduction of the intussusception. The blockage appeared to be a finely ground rubbery substance, there was some scarring and tearing at the area of the obstruction which was removed with the resection of the bowel. The bowel was then repaired with an end-to-end anastomosis. Once the blockage was removed, the build-up of gas dissipated immediately and it was decide to leave the build-up of bowel contents to avoid peritoneal contamination. The duck made a slow recovery. It was hospitalised for post-operative care at an emergency centre for the weekend. It took two days before it was able to pass faeces. At six month follow up the bird was totally back to normal, producing normal droppings.

DISCUSSION

Each of the cases described demonstrate a different type of gastric obstruction affecting a different area of the gastrointestinal tract. Variation in presentation results from the type of obstruction, how its location in the gastrointestinal tract affects the intestine and the species of bird. Species such as ratite birds, galliformes and water fowl seem to be over-represented with proventricular and ventricular foreign bodies (Gelis, 2006). Hand-reared juvenile psittacine chicks suffer from crop foreign bodies as they frequently ingest foreign objects such as feeding tubes, bedding, toys and unhulled seeds (Hoefer, 1997). Large numbers of nematodes may also cause intestinal obstruction, such nematode infections are common in Australian psittacine birds (Gelis, 2006). Extra-luminal obstruction seems common in small birds that develop large masses. In some cases of obstruction, history, clinical pathology and radiographic findings do not always lead to a definite confirmation of obstruction (Adamcak et al, 2000). The cockatiel case highlights the difficulty in obtaining an accurate diagnosis.

Diagnosis of foreign bodies may be made more difficult with the presence of secondary infection. As there can be such varied signs associated with obstructions, a thorough history and examination is critical in the diagnosis. Owners often do not realise the importance of their observations and information such as their bird chewing holes in the towel they use to cover the cage with at night. History such as this may be the difference between a drawn out diagnostic work up, such as the case of the cockatiel described, or a quick resolution. A vigilant owner will provide a good history such as the case of the Gentoo penguin, where an enrichment toy was

noted as missing and the bird that played with it the most was the bird that presented clinically ill, therefore simplifying the diagnosis.

In the cases described in this paper, the clinical presentation of extra-luminal obstruction include a swollen abdomen, intermittent passing of large droppings, respiratory distress and weight loss. Birds with crop foreign bodies (ingluvioliths) present with an enlarged crop, occasional regurgitation, weight loss and inappetance. Fibrous and partial obstructions may present with delayed crop emptying, anorexia, weight loss, lethargy, shifting lameness and reversion to neonatal behaviour (Hayati et al., 2011). Chronic regurgitation has also been reported (Rosenwax and Peacock, 2007). Regurgitation may sometimes be difficult to differentiate from vomiting (Harrison and Ritchie, 1994). Regurgitation is the expulsion of ingesta from the crop while vomiting is the expulsion of ingesta from the proventriculus (Harrison and Ritchie, 1994). Regurgitation can be part of normal behavior when controlled, however pathologic regurgitation is not controlled, as observed with vomiting, the patient often slings its head in the process (Harrison et al., 2006). Ingesta can often be seen matting the feathers on the head and around the cage in these instances. With the increase in the presence of rope and synthetic fur toys and bedding, string foreign bodies are now commonly seen in small pet parrots such as cockatiels and lorikeets (especially, *Trichoglossus haematodus*). In the cockatiel case described in this paper, the clinical signs fluctuated: they improved but then got worse again and never completely resolved. The cockatiel had secondary infections of the crop that confused the diagnosis. Treatment of yeast and bacterial infections failed to result in a full recovery. The foreign material seemed to act like a plug to the outlet of the crop and caused periods of delayed emptying. It was difficult to prove partial obstruction with radiology as the foreign body caused very subtle changes. As the crop is very superficial, it is relatively easy to examine by palpation, however small fibrous foreign objects can sometimes be difficult to palpate with certainty. The presence of secondary disease causing inflammatory changes of the crop lining may also increase the difficulty in palpation of small obstructions. However in the case of the bantam, the phytobezoar was very large and palpated like firm dough that would not break down with massage or lavage. The penguin with the proventricular foreign object appeared depressed, showing reduced activity and interest in its environment, it had reduced appetite and increased respiratory effort. Other common clinical signs reported with proventicular obstruction include regurgitation and scant faeces (Gelis, 2006). The distal intestinal obstruction in the duck presented with reduced appetite, weight loss, passing urine and urates with no faecal component to the droppings, bloating and lethargy. There are many common signs associated with obstruction at any level within the gastrointestinal tract, such as reduced appetite, weight loss, vomiting or pathological regurgitation, reduction in number of droppings and lethargy. A palpable mass in the crop will isolate the obstruction to this area and gaseous loops of bowel with no faeces passed will isolate the obstruction to the intestines. Partial obstructions such as string may be much more difficult to diagnose and isolate to a specific section of the gastrointestinal tract. In all the cases described, the history and clinical presentations gave strong clues as to the problem. Further radiology, haematology, biochemistry and endoscopy when performed, helped to confirm and define the diagnosis.

Clinical pathology changes in the presence of gastrointestinal obstruction may be non-specific: leukocytosis with a heterophilia and abnormal plasma protein concentrations are commonly seen (Adamcak et al., 2000). Adamcak et al. (2000) described a case of intestinal foreign body in a cockatoo, where the haematologic changes were characteristic of chronic inflammation or an infectious process. Departure from common reported results is likely to be caused by secondary infection and the different ways the foreign object is affecting the bird. A complete obstruction

causing problems such as vomiting and no uptake of nutrients, results in changes that differ from a partial obstruction that is not causing vomiting and allowing some normal intestinal function. A chronic obstruction is likely to cause changes such as a nonregenerative aneamia as seen by Adamcak et al. (2000), which is not seen in acute disease. Obstructions that are toxic such as heavy metals will also cause clinical pathology that may vary considerably from a non-toxic obstruction. Hypoproteinaemia was seen in the cases in this paper where bloods were analysed. The duck with the complete intestinal obstruction had a low albumin and globulin reading probably as a result of the obstruction affecting the intake, digestion and absorption of food. Hypoproteinaemia, although a consistent finding, is not very specific for gastrointestinal obstruction. The cockatiel had anaemia, hypoproteinaemia and an inflammatory response, although commonly reported in obstruction these findings may also be seen in many disease processes and only highlight common secondary systemic changes (Doneley, 2011) seen in gastrointestinal disease. Clinical pathology may therefore be most valuable, evaluating and planning a course of treatment and as a prognostic indicator. In gastrointestinal obstructive disease it may be less reliable as a diagnostic tool by itself.

Radiology is the most useful tool in the confirmation of the diagnosis and understanding of location of gastrointestinal obstructions in all parts of the gastrointestinal tract. However not all obstructions are radiolucent and the use of contrast medium for both intraluminal and extraluminal blockages can be invaluable. Both barium and iohexol have been described in the use of contrast studies of the avian gastrointestinal tract (Ernst et al., 1998). However partial obstructions such as the string foreign body described in the cockatiel case may still be very difficult to confirm even with contrast. Although contrast can be easily delivered via a crop needle, care needs to be taken when radiographing the birds. If sedation or anaesthesia is used, aspiration of contrast material is a major concern. Taking care not to compress the crop and ensuring the bird's head is elevated and ideally intubated, are all important considerations when performing contrast studies with anaesthesia.

Non-surgical treatment can resolve gastrointestinal obstructions in some cases. Crop lavage may be a successful treatment in cases of crop foreign bodies. Rosenwax and Peacock (2007) described five cases of where a non-invasive procedure to relieve crop obstructions was successful. Crop washing was initially attempted in the silky bantam case described in this paper, however the phytobezoar was so large that after several attempts of lavage and massage it became obvious that the best option was surgical removal.

Surgical intervention is often required to relieve obstructions. Surgery on small birds requires microsurgical techniques and equipment along with a significant dexterity (Forbes, 2002). Crop surgery is one of the simpler surgeries on the gastrointestinal system. Enterotomy is an uncommon procedure that carries a guarded to poor prognosis (Forbes, 2002). As birds have no mesentery, enterotomy also carriers a much higher risk of post-operative peritonitis than other species (Forbes 2002). The decision to perform an exploratory celiotomy to relieve potential or proven gastrointestinal obstructions may be harder to make in birds than in other species due to the higher risks and increased surgical skill required for a successful outcome (Forbes, 2002). However enterotomy and enterectomy described in the Appleyard duck indicates that some animals do survive even despite a considerable delay in the decision for surgery (four days after admission to hospital). Careful planning of the surgery, good surgical technique and preparation of the patient were important in the success of this case. This duck began preparation more than 12 hours before the surgery, injectable anaesthetics were chosen to help with a smoother

anaesthetic, avoiding the dive reflex at induction and improving control of the anaesthetic when the airsacs were open. Not emptying the bowels during surgery to minimise the chance of peritonitis and post-operative care in an emergency clinic were both decisions that helped ensure a positive outcome.

The endoscope is a useful tool in the removal of foreign material and may be used to confirm the presence of foreign material in the upper gastrointestinal tract. Although a flexible scope was used in the penguin, a rigid scope may have also been used as the avian oesophagus, crop, proventriculus, and ventriculus are arranged in a relatively linear manner (Taylor and Murray, 1999). Endoscopy is even more useful in those species that do not have a well-developed crop or those that don't have a crop at all. It helps considerably to have an understanding of the anatomy of the intestinal tract of the species when using endoscopy. With the large foreign object found in the penguin, careful manipulation was important as it was pulled from the proventriculus and up the oesophagus. The areas where the object required most care in manipulation included the division between the proventriculus and the oesophagus and over the region of the heart where it caused some mild ulceration of the oesophageal lining and some concern with how the object might compress the heart as it was removed.

CONCLUSION

Gastrointestinal obstruction occurs in all species of birds and may occur along any section of the gastrointestinal tract. Blockages, especially partial obstructions can sometimes be difficult to diagnose and confirm. A thorough history and examination are important. Radiology with or without contrast is invaluable for confirmation and understanding of the location of the obstruction but is not always required. Blood tests highlight secondary inflammatory processes and probably help more in treatment plans and as a prognostic indicator as opposed to the diagnosis of an obstruction. Non-invasive techniques such as crop lavage (for crop foreign bodies) or endoscopy are sometimes used to treat blockages. However each case needs be assessed individually based on the location of the obstruction and state of the bird, the equipment available and the skill of the operator. The decision to perform exploratory celiotomy and surgical removal of gastro-intestinal blockages may be harder to make in birds than mammals due to the higher risks and increased surgical skill and experience required for a successful outcome.

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