

## **FIBROSING INGLUVITIS IN TWO COCKATIELS (*Nymphicus hollandicus*)**

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### **CASE REPORT**

This report outlines the development of crop strictures, secondary to deep candidal infection, in two young cockatiels (*Nymphicus hollandicus*) that initially presented with flagellate infections of the crop. The cases are interesting in that yeasts were not found at any point in the disease course, despite repeated crop washes.

Two young hand-reared cockatiels were presented for vomiting, approximately one and a half weeks after purchase from a breeder. A third cockatiel had also been purchased from the same breeder, but was not showing any clinical signs. The birds had been kept separately from the other birds at the owner's premises.

The two cockatiels were lean (85 g and 80 g), with crusted vomitus around the head. Microscopic examination of a crop wash showed mucoid material with motile flagellates, along with a mild increase in Gram positive bacteria. All three birds were started on metronidazole at 20 mg/kg PO BID for seven days.

Both birds deteriorated over the next 24 hours, and were admitted to hospital. The medication with metronidazole was continued, and the first bird was started on injectable metoclopramide (Metomide, Delvet, Seven Hills, NSW) at 1 mg/kg IM twice daily. The second bird was no longer vomiting, so was treated with supportive care. Both birds were crop fed with hand-rearing formula (Roudybush Handrearing Formula 3, Roudybush Inc., Woodland, California, USA) three times daily (approximately 3-5 ml per feed). Wet smears of crop lavages, oropharyngeal smears with cotton tips and faecal examinations were performed at least daily.

A crop smear showed Gram negative bacteria by day 3, indicating a possible ingluvitis, and enrofloxacin was added at 15 mg/kg PO twice daily. Flagellates were no longer observed in crop smears by day 2 post-presentation. At no time were yeast or fungal elements detected.

Over the next five days, both birds showed occasional responses to medication, but overall continued to gradually deteriorate. By day five of treatment, the first bird had lost significant weight, and was vomiting before and after handling, and after feeding. The volume of hand-rearing formula that could be administered by crop tube had reduced to less than 1 ml. A stricture of the crop was present in the proximal oesophagus, approximately 1.5 cm distal to the oropharynx. The bird was euthanased

on day six.

At this point, the second bird was brighter than the first had been, although it did regurgitate infrequently after feeding. Meloxicam at 0.25 mg/kg PO twice daily was started on day 6, in an attempt to prevent a further crop stricture forming. By day eight, it was clear that a stricture was beginning to form despite treatment, and this bird was also euthanased.

Gross post-mortem examination on both birds showed narrowing of the oesophageal portion of the crop, consistent with stricture formation. This was present in both birds, but more severe in the first bird.

Histopathology of the crop of the first bird showed focal to diffuse infiltration of the superficial to deep layers of the epithelium with invading yeasts forming pseudohyphae consistent with *Candida albicans* infection. Associated with this were foci of heterophilic rich inflammatory cellular infiltration of the submucosa and exudation. There was a focal to extensive fibroblastic thickening of the submucosa which extended deep into the adnexal connective tissue. Deep within this fibroblastic tissue were several transparent, small refractile linear foreign bodies measuring approximately 80 µm long and 5 µm thick. The histopathological diagnosis was chronic fibrosing ingluvitis due to candidiasis, with the foreign material thought to represent trapped ingested material following a previous period of ulceration.

The histopathology on the second bird showed relatively normal crop epithelium with mild diffuse hyperplasia. In several focal areas there were moderate numbers of *Candida* spp present on the surface with foci associated with submucosal fibroplasias. No invading organisms were seen.

## DISCUSSION

Strictures of the oesophagus or crop are uncommon in birds. Those that are seen are usually due to trauma or post-surgical complications (personal observation). Strictures related to infection would seem to be extremely unusual. In human literature, oesophageal strictures after fungal infection are described as rare (Péter and Telegdy, 2002; Lingelbach et al., 2003).

The lack of identifiable yeast at all testing points during the disease process is also noteworthy. Although poor crop washing technique is one possible explanation, repeated sampling would hopefully have detected yeasts present within the crop lumen and on the crop mucosa. Perhaps the presence of the yeasts deeper within the tissue reduced the sensitivity of crop washing as a tool.

In humans, *Candida* species are usually considered opportunistic pathogens, and require a change in conditions (such as antibiotic administration) or a deficiency in host immunity (temporary or permanent) to cause clinical disease (Dahlhausen, 2006; Schulze and Sonnenborn, 2009). These birds were related, so a genetic predisposition to invasive candidiasis is possible. However, generalized immunosuppression could also have occurred due to a shared environment (eg poor hygiene, poor nutrition while being hand-reared).

Initially, it was thought that repeated crop trauma from crop tubing may have begun the process of stricture formation. However, the stricture did not develop until later in the course of treatment, and was closely associated with fungal invasion histologically. Crop trauma may have allowed an initial ulceration, but the stricture itself was clearly secondary to bacterial invasion

Once a stricture was identified, treatment options included repeated therapeutic dilation of the site, or surgery. Surgical options included resection and anastomosis of the area, or 'plasty' techniques. Myectomy and myoplasty have recently been reported in a horse with oesophageal dilatation and stricture (Voermans et al., 2009). These cockatiels were in poor condition for either single or repeated anaesthesia, and this option was declined by the owner. In hindsight, if either dilatation or myoplasty had been attempted, the final diagnosis may not have been obtained, as a biopsy may not have been done. In that case, given the failure to identify *Candida* spp on crop washing techniques, adequate antifungal treatment may not have been instituted, increasing the chance of stricture reformation.

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