Avian Cryptococcosis - A Case Report

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Signalment:

Long-billed Corella (*Cacatua tenuirostris*) of undetermined age, that had been with the current owner for several years.

Lesion:

A proliferative mass causing disruption of the rhamphotheca and deep structures of the left upper bill and left side of the face, in the pre-orbital region. The bird had been treated with oral Amoxycillin for 3 weeks, by another veterinarian, with no improvement.

Differential Diagnosis:

Cryptococcosis (gelatinous myxomatous material)
Neoplasia (e.g squamous cell carcinoma, fibroma/fibrosarcoma, lymphoma)
Sinus infection/bacterial granuloma/abscess
Mycobacteriosis
Poxvirus (exotic to Australia?)
Foreign body reaction/granuloma

Diagnostic Procedure:

GA and close examination followed by:

- Fine needle aspirate and cytology
- Radiology
- Biopsy and histopathology

Cryptococcus

- A large saprophytic yeast-like fungus producing a large mucopolysaccharide capsule. It can be found on the skin and in the intestinal tract of normal animals and birds;
- Spread by inhalation.;
- Airborne basidiospores (sexual propagules - potentially infectious for humans) are in the air for only a very short time, and are dispersed during flowering of the host plant;
- After dissemination, basidiospores undergo transformation to encapsulated cells capable of budding (asexual propagule);

- Yeast cells are prone to being removed from the environment by microorganisms or exposure to sunlight;

- Unlike other yeasts, it can use the abundant creatinine in birds' droppings as a source of nitrogen;

- Isolated particularly from droppings or nesting material of starlings, pigeons, canaries, psittacine birds and poultry; and

- Upper respiratory tract may be predisposed to infection because of lower mean temperature than the rest of the body.

Significant Species

C *neoformans* var *neoformans* (serotypes A and D) and ***C neoformans* var *gattii*** (serotypes B and C). Both varieties have been identified as a human health hazard. The serotypes are identified on the basis of capsule-specific antigens.

C neoformans* var *neoformans:

- The asexual propagule is commonly isolated from pigeon droppings - has been passed through the pigeon gut harmlessly as pigeons are resistant to infection by *Cryptococcus*;

- The original source of the sexual stage has not been identified - it is thought to be a flowering plant such as a common grass or cereal that pigeons feed upon;

- Grows poorly at temperatures over 40 ºC; and

- Rarely causes problems in birds.

C neoformans var gattii:

- The source is the River Red Gum (***Eucalyptus camaldulensis***) and Forest Red Gum (***E. tereticornis***). There is a specific ecological relationship between the organism and the plants.

- Isolated from bark, wood and leaves and debris beneath these trees in South Australia and southwestern New South Wales. Airborne propagules have been isolated from under the canopy of flowering River Red Gums but not from under trees that were not flowering. A similar finding was demonstrated with Forest Red Gums in southeast Queensland and New South Wales in damp well protected areas - e.g. hollows.

- Grows poorly at temperatures over 37 ºC

Cryptococcus sp are encapsulated organisms that do not aerosolise unless desiccated. Thus handling of animals and their **fresh** discharges, or cryptoccocal organisms in culture do not carry a significant risk of infection. Direct animal-to-animal or animal-to-man transmission has not been reported. Infection has not been demonstrated following ingestion or cutaneous inoculation.

Discussion

Cryptococcosis has a worldwide distribution, affecting many mammals, including man. It commonly has an association with the respiratory tract but may also disseminate to viscera, skin, bones or the central nervous system. In birds, it is an uncommonly encountered infection of the respiratory tract. Its major significance is in its zoonotic potential.

Clinical Signs of Cryptococcosis in Companion Birds:

- ✴ Depression
- ✴ Weakness
- ✴ Muscle atrophy
- ✴ Anorexia
- ✴ Anaemia
- ✴ Weight loss
- ✴ Acute diarrhoea
- ✴ Incoordination
- ✴ Paresis/paralysis
- ✴ Blindness
- ✴ Dyspnoea
- ✴ Nasal exudate – gelatinous material in the nasal cavity and infraorbital sinuses
- ✴ Oral/respiratory masses
- ✴ Death

In gallinaceous birds it causes a necrotic, granulomatous disease of the intestines, liver, lungs and spleen.

Diagnosis

- ✴ Smear from gelatinous material/aspirate
  Fine needle aspirate will demonstrate an inflammatory reaction with large numbers of yeast-like organisms. Stains well with:

  - ✗ Gram
  - ✗ Wet mount with India ink or Parker ink
  - ✗ New methylene blue

  Present as large, oval budding yeast (4-7 um), surrounded by a capsule 2-4 times the diameter of the cell. Surrounding inflammatory response is usually minimal and present as epithelioid macrophages or multinucleated giant cells and heterophils

- ✴ Fungal culture - grows well on commonly used culture media e.g Sabouraud-dextrose agar.

- ✴ Haematology

  - ✗ heterophilia occasionally present
  - ✗ anaemia common

- ✴ Post mortem examination: necrotic granulomas in:

- ✗ spleen
- ✗ liver
- ✗ lungs
- ✗ intestines

✴ Serology: latex agglutination (if available) - elevated titre

✴ Specimens of fresh and fixed tissue should be sent to a laboratory for culture and histopathology.

Infection in birds usually presents as swellings or granulomatous masses around the sinuses or face. A commonly reported history is of a chronic problem with a poor response to antibiotic therapy. It may be mistakenly identified as a tumour mass.

Birds are thought to be resistant to infection with *Cryptococcus* sp because of their relatively high core body temperature. This is supported by the fact that *Cryptococcus* sp is unable to be cultured or grown in chicken embryos in vivo in temperatures above 40^{o}C. It has been theorised that the upper respiratory tract may be more easily colonised because of its lower temperature.

Species it has been reported to affect include:

Psittacine birds: mostly large parrots (many have been hand-reared) such as African grey parrot, eclectus parrot, moluccan cockatoo, triton cockatoo, long-billed corella, thick-billed parrot, green-winged macaw, crimson rosella,

Columbiform birds: Bartlett's bleeding-heart pigeon, beccari's crowned pigeon,

Others: canary, munia finches, north island brown kiwi.

Treatment

- ✴ Consider public health issues before beginning treatment;
- ✴ Best success is associated with early detection and aggressive treatment;
- ✴ Surgery to debulk any proliferative mass;
- ✴ Ketoconazole (Nizoral) 2mg/kg bid *per os* and gradually increase to 25mg/kg bid *per os.* Reduce dose if bird ceases to eat;
- ✴ Fluconazole (Diflucan) 8 mg/kg/day for at least 2 months (this is regarded as the most effective medication for tissue-based yeasts);
- ✴ Recurrence of the lesions many weeks to months after treatment is ceased is common.

Recommendations:

✴ To assist in zoonotic prevention don't collect browse from the plants listed above during their flowering season;

✴ Pet birds are an unlikely source of *Cryptococcus* infection and transmission to people;

- ✴ Limit exposure of people to areas where droppings from pigeons (or the other species listed) have accumulated;

- ✴ Euthanasia should be given serious consideration with infected birds because of the public health risk – especially if immunocompromised people are in close association. *Cryptococcus neoformans* can cause severe meningitis in people.
- ✴ Take precautions for your own safety when performing a post-mortem examination on a suspect bird.

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