

Trichomoniasis, Pox and Aspergillosis

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Pet Emergency & Specialty Center-
Avian/Exotic Service Pet

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Trichomoniasis

- ◆ Mostly pigeons, doves, songbirds, raptors
- ◆ Parasitic disease (flagellate)
 - Primary or Secondary pathogen
- ◆ “Canker” or “Frounce”
- ◆ First described in literature in 1500s by John Moore in England
- ◆ Introduced to NA with rock doves

Trichomonas- Transmission

- ◆ Horizontal transmission via water source, courtship
- ◆ Vertical transmission via crop milk and infected prey items
- ◆ Immunity in columbiforms via crop milk secretions
- ◆ Resistance through previous exposure

Pathogenesis

- ◆ Pigeons and doves-
reservoir and host
- ◆ Horizontal
transmission to other
birds through
contact, water source
- ◆ Vertical
transmission- feeding
of crop milk

Trichomonas- Determinants

- ◆ Virulence of strain varies
- ◆ Immune status of host
 - Compromised by other disease
 - Often accompanies viral illnesses, ornithosis complex, parasitic diseases, and noninfectious conditions
- ◆ Stress

Clinical Signs

- ◆ Upper alimentary and respiratory tract
 - Erosion of palatal flaps
 - Miliary abscesses
 - Caseous debris in oral pharynx, crop
 - Tracheal obstruction
- ◆ Foul odor, dysphagia, weight loss, lethargy
- ◆ Can become locally invasive

Diagnosis

- ◆ Wet mount of oral secretions
 - No cyst stages (as in giardia)
 - Only trophozoite
 - ◆ Undulation movement
- ◆ Lesions removed usually do not bleed (as in pox)
- ◆ Differentials: pox, aspergillosis, candidiasis, Vit A deficiency, pseudomonas infection
- ◆ In Pouch TF culture pack- tests for T. fetus in cows, more sensitive than wet mount

Treatment

- ◆ Treat underlying illness
- ◆ Nitroimidazoles
 - Carnidazole- 30 mg/kg SID x 2 days
 - Metronidazole (Flagyl) 100 mg/kg SID x 3 days
- ◆ Maintain caloric and fluid intake
- ◆ Surgical debridement

Prevention/Control

- ◆ Reducing stress in flocks or captive animals
- ◆ Controlling other diseases
- ◆ Total eradication not practical
- ◆ Do NOT feed fresh pigeons to raptors
 - Frozen/thawed

Pox Virus

- ◆ Largest of viruses
- ◆ Avipoxviruses found worldwide
- ◆ Occur in over 20 families of birds
- ◆ Most likely Family-specific (examples)
 - Falcon pox
 - Pigeon pox
 - Canary pox
 - Fowl pox

Pox Transmission

- ◆ Via mosquito or mechanically through integument breaks
 - Possibly mites or blood feeding insects
- ◆ More common in spring (rainy season)
- ◆ Mosquitoes can be infective for weeks to months.

Pox Disinfection

- ◆ Extremely durable in the environment
 - Can survive years in dried organic matter
- ◆ Killed by 1% KOH, 2% NaOH, 5% phenol, heating to 50° C for 30 minutes

Pox- Pathogenesis

- ◆ 10-14 days post-infection
 - Blepharitis
 - Ocular discharge
 - Rhinitis/conjunctivitis
 - “raised papules” on featherless areas
- ◆ >14 days
 - Crusts dry, scab over
- ◆ Persistent infections can last 13 months or longer
- ◆ Stress can re-activate viral multiplication

Pox- Determinants

- ◆ Strain of virus
- ◆ Mode of transmission
- ◆ Age, species and health of infected birds

Pox- Clinical Signs

- ◆ Dry Pox
 - Cutaneous lesion (previously described)
- ◆ Wet Pox
 - Mucosal papules of oropharynx
 - Possible neurologic signs
- ◆ Septicemic Pox
 - Acute death, mostly in canaries/finches
- ◆ Viral-induced neoplastic lesions (skin)

Pox- Diagnosis

- ◆ Based on typical clinical signs
- ◆ Histologic findings
 - Bollinger bodies
- ◆ Viral isolation
- ◆ PCR

Pox- Treatment

- ◆ Support care
 - Fluid and nutritional support
 - Systemic antibiotics for 2nd infections
- ◆ Most dermal lesions are self-limiting
 - Healing times 3-4 weeks
- ◆ Survival produces immunity for 6-12 months

Pox- Prevention/Control

- ◆ Mosquito Control
- ◆ Isolation of affected individuals
- ◆ Vaccination
 - Fowl pox vaccine
 - ◆ Some protection for falcons, pigeons, water fowl
 - ◆ Protection 3-4 weeks after vaccine
 - Canary pox vaccine
 - ◆ No protection for other birds

Aspergillosis

- ◆ Eucaryotic organism
- ◆ Have rigid walls, lack chlorophyll
- ◆ Aspergillus
 - Saprophytic (“soil loving”)
 - 600 species (12 causing disease in people)
 - Ubiquitous and opportunistic
- ◆ ZONOTIC

Aspergillosis- Transmission

- ◆ Initiation via inhalation
- ◆ Spores develop into hyphae and invade vasculature = hematogenous to other organs and CNS

Aspergillosis- Pathogenesis

- ◆ Overwhelming numbers of inhaled spores
- ◆ Immune status of individuals
 - Concurrent disease
 - Poor nutrition
 - Adverse environmental conditions
 - ◆ Poor sanitation, ventilation, moldy feed
- ◆ Formation of aspergilloma or disseminated

Pathogenesis 2

- ◆ Classification
 - Acute vs Chronic
 - Disseminated vs Localized

Aspergillosis- Determinants

- ◆ # of spores inhaled
- ◆ Immunocompetency of host
- ◆ Species of host
 - Pigeons and doves
 - Ducks and geese
 - Birds of Prey- all species
 - ◆ Bald eagles, golden eagles, goshawks, immature red tailed hawks, snowy owls

Aspergillosis- Clinical Signs

- ◆ Nonspecific:
lethargy, anorexia,
weight loss
- ◆ Respiratory:
dyspnea, change in
phonation
- ◆ PU/PD
- ◆ Acute death

Aspergillosis- Diagnosis

- ◆ CBC- can be elevated, depressed or normal
- ◆ Serum Chemistries- often normal unless specific organ involvement
- ◆ Radiographs- air sac masses
- ◆ Gram stain- identify fungal anatomy
- ◆ Cytology- allows identification of more cellular detail

Further Diagnostics

◆ Serology

– Antibody

- ◆ Pros...indication of exposure and response
- ◆ Cons...depends on host to produce antibodies. Negative do not mean no disease

– Antigen

- ◆ Pros...non-species specific, paired titers
- ◆ Cons...not diagnostic for current infection

More Diagnostics

- ◆ Polymerase Chain Reaction (PCR)
 - Amplification of DNA
 - ◆ Pros...high sensitivity/specificity
 - ◆ Cons...Does not detect live organism
- ◆ Histopathology
 - Definitive Diagnosis
 - Determine invasion of fungal hyphae into tissue
- ◆ Fungal Culture- live organism

Galactomannan

- ◆ A major polysaccharide antigen of *Aspergillus* sp. cell wall
- ◆ Commercial assay available in human medicine for serum and BAL samples
- ◆ Univ. of Miami has established test for some avian species
- ◆ Confirmed infected has a 2.6-fold rise
- ◆ ELISA test in confirmed affected CAGs
 - 67% sensitivity
 - 73% specificity

Definitive Diagnosis

- ◆ Cytological sampling
 - Aspiration, lavage, endoscopy, celioscopy
 - Wet mount with lactophenol cotton blue stain, new methylene blue
- ◆ Culture
 - Endoscopic or swab
 - Sabourand dextrose agar or blood agar
 - ◆ Microscopic exam= thick walled, septate hyphae
 - Must see spores to speciate

Treatment Goals

◆ General

- Prevention in captive animals is optimal
 - ◆ Clean, sanitized, stress-free environ
 - ◆ Well ventilated
 - ◆ Prophylactic use of antifungals (?)
 - ◆ Vaccine available for turkey poults for *A. fumigatus* (?)
- Dependence on location and extent of disease
- Aggressive therapy increases success
 - ◆ Surgical debridement of airs sac or syringeal lesions
 - ◆ Anti-fungal therapy

Aspergillosis- Treatment

- ◆ Systemic antifungal medication
 - Polyenes: Amphotericin B
 - Fluoropyrimidines: Flucytosine
 - Azoles: Itra-, Flu- and Voriconazole
 - Echinocandins: Caspofungin
 - Allylamines: Terbinafine

Anti-fungal Therapy

- ◆ Goals of therapy (3)
 - Lesions restricting air flow are removed (debulk)
 - Kill or eliminate fungal organisms (antifungal meds)
 - Support care during recovery (fluids, Ab, force feed)

Amphotericin B

- ◆ Only fungicidal available and is gold standard
- ◆ Not absorbed orally
- ◆ IV or IO (initially) for severe cases
- ◆ Intracavitary (infused into air sac or aspergilloma)
- ◆ Intratracheally
- ◆ Nebulization

Azoles

- ◆ Itraconazole/Fluconazole
 - For less severe cases
 - Does NOT enter brain/CNS (Fluconazole does)
 - Enhanced absorption with fatty meal
 - Fairly palatable

Additional Therapy

- ◆ Terbinafine (Lamasil)
 - Allylamine anti-fungal
 - Inhibits ergosterol (cell wall component)
 - Oral: 10-15 mg/kg PO BID
 - Topical
 - Nebulization
 - Intracavitary injection

Newer Drugs

◆ Voriconazole

- Oral or IV
- 10-18 mg/kg BID x 30-90 days
- Wide distribution
- Few adverse effects
- High safety
- Less resistance than itraconazole

◆ Caspofungin (Cancidas)

- B glycan inhibitor (cell wall)
- IV only
- Highly lipid soluble

Nebulization Therapy

<u>Drug</u>	<u>Dosage (per 15 ml)</u>
Amikacin	75 mg
Amphotericin B	100 mg
Chloramphenicol	200 mg
Enrofloxacin	150 mg
Gentamicin	75 mg
Terbinafine	15 mg
Tylosin	150 mg

Nebulization

- ◆ Drugs: amphotericin B or terbinafine (Lamasil)
 - Allows penetration into air sacs
 - Must micro-size droplet 3-5 microns diameter
- ◆ Can also administer through air sac cannula
- ◆ Bronchodilators
- ◆ Mucolytic agents

Aspergillosis- Prevention/Control

- ◆ Reduction of environmental risk factors
 - Sanitation and ventilation
 - Good plane of nutrition
 - Reduce stress
- ◆ Prophylactic use of antifungal medication

Zoonotic Potential

- ◆ Inhalation of spores
 - Dose dependent
 - Aspergillus must be sporulating
- ◆ Cutaneous contact
 - Requires dermal integrity compromise (cuts, etc.)



"Avian Flu hits Trailer Park"

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