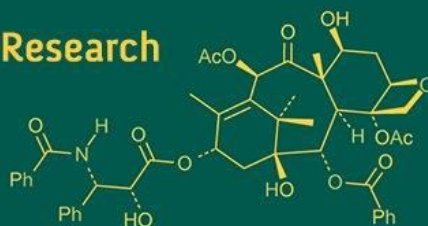


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Pathological study of candidiasis in a desi bird: A case report

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Abstract

Candidiasis is a fungal disease affecting poultry, primarily caused by the genus *Candida*. A poultry desi bird of 40 days old was presented for necropsy to the Department of Veterinary Pathology, Veterinary College, Hassan with a history of weakness and anorexia. It was from a flock with a total of 1100 birds in which death of 10-20 birds each day were recorded. On external examination, body condition appeared poor, conjunctival mucous membrane was pale. The keel bone was prominent. Internal examination revealed intestine with moderate diffuse petechial haemorrhage and turkey towel appearance of crop. The sample from the crop was submitted to Department of Microbiology for culture and identification. The sample cultured on Sabouraud dextrose agar revealed thick creamy colonies typical of yeast. Microscopic examination of the colonies stained by Gram's stain revealed budding yeast cells characteristic of *Candida* species. Antifungal assay performed using the pure colony of *Candida* spp. by disc diffusion method revealed that the isolate was sensitive to all the antifungal agents used.

Keywords: Candidiasis, crop, Desi bird, Turkey towel appearance

Introduction

Avian candidiasis caused by *Candida albicans* is a sporadic disease which causes upper digestive tract mycosis. These commensals cause clinical diseases under stress, immunosuppression, concurrent debilitating diseases, disturbance in normal digestive flora due to long term antimicrobial therapy, hypovitaminosis A, aflatoxicosis, high stocking densities and poor management. Crop candidiasis is the most common *Candida* caused disease in poultry. These infections are called crop mycosis, thrush, moniliasis or sour crop. Enteric infection is not the only clinical disease that is caused by *Candida* species. Cutaneous candidiasis and comb candidiasis are also important and can lead to feather loss and considerable morbidity (Dykstra *et al.*, 2017) [3].

As *Candida* species are part of the normal flora, sources of infections are mainly endogenous. Exogenous infection occurs when a non-infected bird directly contact a diseased bird or indirectly by contacting the secretions and feces of a bird that is infected with *Candida* species (Asfaw and Dawit, 2017) [1]. The yeast has virulence factors *viz* integrin-like molecules, proteases and phospholipases. These help the organism to attach to and invade host tissues and cause disease. Other factors that help in evasion of the animals immune mechanisms include: biofilm formation and phenotypic switching (Quinn *et al.*, 2011) [5]. In an immune compromised host, the cells of *Candida* can attach to mucosal cells and rapidly change their form from yeast to hyphal form. This form is large and the phagocytic cells are not able to clear. The penetration of host mucosal tissue by hyphae is facilitated by the presence of high concentration of phospholipase enzymes at the tips of hyphae (Dykstra *et al.*, 2017) [3]. The present communication describes pathological findings of Crop mycosis in a desi bird.

Materials and Methods

A Poultry desi bird of 40 days old was presented for necropsy to the Department of Veterinary Pathology, Veterinary College, Hassan with a history of weakness and anorexia and deaths of 10 to 20 birds daily for a week in a flock of 1100.

On external examination of the carcass, body condition was poor with pale conjunctival mucous membrane. The keel bone was very prominent with pale musculature and subcutaneous tissue. Internal examination of crop revealed turkey towel appearance. After gross examination, the representative sample was collected from the crop and submitted to Department of Veterinary Microbiology for culture and identification. Also representative samples of tissues from crop were collected in 10 percent Neutral Buffered formalin for histopathology. The tissue samples were routinely processed, sectioned and stained with Haematoxylin and Eosin stain. Periodic Acid Schiff stain was used for demonstration of yeast organisms (Suvarna *et al.*, 2018) [6].

Results and Discussion

Candida infections are common detrimental health issue especially, caused by *Candida albicans* in birds. Free-living birds are more vulnerable to *Candida* infections transmitted by contaminated food or water sources. In caged birds, the most common transmission of this infection is usually linked to poor diet, stress and lack of husbandry practices.

In the current investigation, external examination of carcass revealed poor body condition, pale visible mucosa with prominent keel bone. In younger birds, where the disease usually is more severe, it is possible to observe anorexia, lethargy, crop stasis, delayed crop emptying, regurgitation and white plaques in the oral cavity (Asfaw and Dawit, 2017) [1]. Internal examination of crop revealed thickened wall and the lumen was filled with diptheritic material (Fig 1). The intestine showed moderate diffuse petechial haemorrhage both on serosa and mucosa. Thickening of crop mucosa with yellowish-white, pseudomembranous deposits infer it as 'sour crop' or 'thrush. Candidial hyphae penetrate the stratified squamous epithelium perpendicular to the mucosal surface. Invasion of *Candida albicans* into deeper mucosal epithelium leads to hyperplasia. Mycelial invasion and subsequent epithelial hyperplasia cause necrosis and bacterial growth. Young birds are more susceptible than older birds to mycosis of the digestive tract (Asfaw and Dawit, 2017) [1].

In the current study, the standard solid Sabouraud dextrose Agar media used to cultivate *Candida spp.* revealed thick creamy colonies typical of yeast. Microscopic examination of the colonies stained by Gram's stain revealed budding yeast cells characteristic of *Candida* species (Fig 2). Direct examination can be performed using various chemicals based on the type of the sample such as lesions in crops, esophagus or the mucus membrane in lacto phenol-cotton blue tissue section stained by PAS (Periodic acid-Schiff) or GMS (Gomorimethylamine silver fixed smears stained with Wright's and Geimsa (Babu *et al.*, 2024) [2]. Antifungal assay performed using the pure colony of *Candida spp.* by disc diffusion method revealed that the isolate was sensitive to all the antifungal agents used (Fig 3).

Histopathological examination of the crop section revealed hyperplastic squamous cell layer of mucosa and ballooning degeneration of squamous cell epithelium (Fig 4-5). On special stain with PAS revealed budding yeast cells over the surface of the hyperplastic epithelium (Fig 6) and its septate hyphae was found penetrating deep into the mucosa. Staining with PAS stain aid in visualization of the fungal hyphae that penetrate the crop mucosa. This stain is preferred for fungal hyphae staining. The direction of

hyphal growth is opposite to the epithelium's surface and it penetrates the outer layers of the stratified squamous epithelium involving the stratum corneum layer and the superficial portion of the stratum spinosum. The fungal growth causes tissue reaction comprising inflammatory cells infiltration. Post-mortem tissue or biopsy samples can be collected and stained with Periodic Acid-Schiff or Gomori methyamine silver. It is possible to observe pseudohyphae and budding yeast forms, especially in the sloughed epithelium (Hussein *et al.*, 2024) [4].



Fig 1: Crop showing thickened wall with diptheritic material

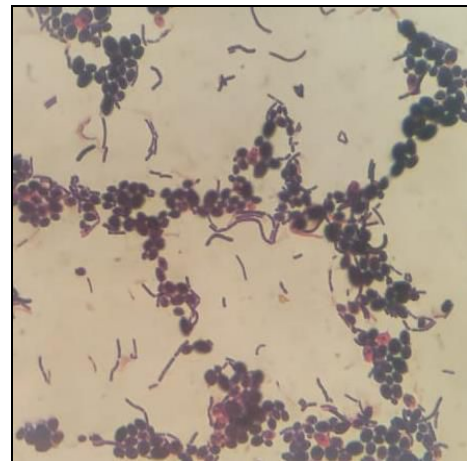


Fig 2: Smear showing budding yeast cells characteristic of *Candida* species. Gram's, 1000X



Fig 3: Antifungal assay by disc diffusion method showing sensitivity to all the antifungal agents used.

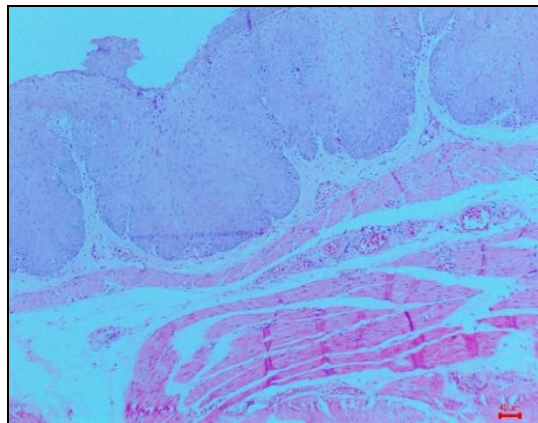


Fig 4: Histopathological examination of the crop showing hyperplastic squamous cell layer of mucosa. H and E, 100X

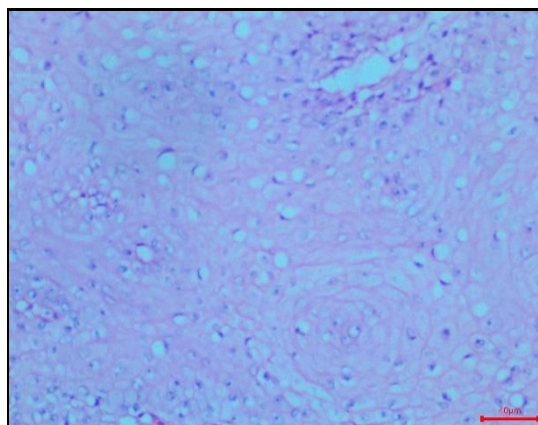


Fig 5: Histopathological examination of the crop showing hyperplastic squamous cell layer of mucosa with ballooning degeneration. H and E, 400X

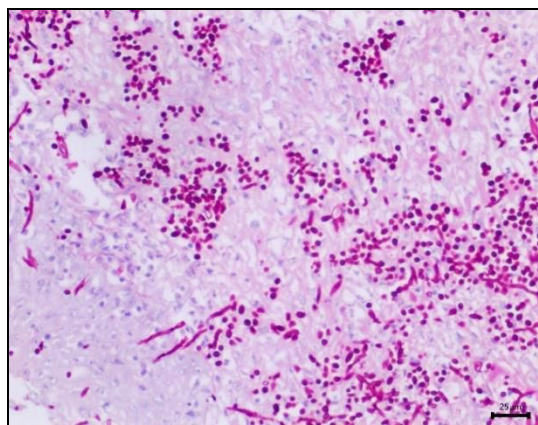


Fig 6: Histopathological examination of the crop showing budding yeast and spores in the hyperplastic squamous epithelium layer. PAS, 400X

Conclusion

In conclusion, the diagnosis in this case was supported by a comprehensive gross, microscopic and histopathological examination, along with the clinical history. Good sanitary conditions in the flock environment along with elimination of any predisposing factors are enough for the prevention of clinical candidiasis. Infected birds must be removed from the rest of the flock as they are a potential source of infection.

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