

## *Ascaridia galli* induced ulcerative proventriculitis in a poultry bird

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**Abstract** Various possible causes of proventriculitis include virus, bacteria, fungus, protozoans, nematodes, biogenic amines and excessive copper sulphate. In the present case, parasites were found in the lumen of the proventriculus, gizzard and duodenum of a poultry bird. Characteristic features of the parasite were studied and confirmed as *Ascaridia galli*. An ulcerative proventriculitis evident as denuded superficial epithelium, sub-epithelial hemorrhages, infiltration of the inflammatory cells and fibrosis were seen at histopathology. Proventriculitis caused by *A. galli* has not been reported till date. Here, we report a case of ulcerative proventriculitis in a poultry bird caused by nematode, *A. galli*.

**Keywords** *Ascaridia galli* · Light microscopy · Poultry bird · Ulcerative proventriculitis

### Introduction

Proventriculitis may be possibly caused by either viruses (Marusak et al. 2012) viz., infectious bursal disease virus

(Pantin-Jackwood et al. 2004), infectious bronchitis virus (Yu et al. 2001), adenovirus (Lenz et al. 1998), reovirus (Kouwenhoven et al. 1988; Lenz et al. 1998); bacteria (Huff et al. 2001); megabacteria (Henderson et al. 1988; Huchzermeyer et al. 1993); Zygomycosis (Jeffery et al. 1994), aspergillosis (Dorner et al. 1983); protozoan *Cryptosporidium* (Blagburn et al. 1991) and *Toxoplasma gondii* (Henderson et al. 1988), *Dispharynx nasuta* (Goble and Kutz 1945); biogenic amines like cadaverine, tryptamine and histamine (Harry et al. 1975, Poole 1994) or excessive copper sulfate (Bayyari et al. 1995). *Ascaridia galli* is perhaps the most common roundworm in all types of poultry and is distributed across the globe (Ackert 1931; Katakum et al. 2010). We report a rare case of parasitic ulcerative proventriculitis caused by *A. galli* in a poultry bird.

### Materials and methods

An adult poultry bird was presented for post mortem to Poultry disease diagnostic laboratory, Department of Veterinary Pathology, GADVASU, Ludhiana. A thorough necropsy of the bird was conducted and lesions were recorded. The visible parasites were collected in the normal saline solution. They were cleared by keeping in sufficient amount of lactophenol in petridish and identified as per Soulsby (1986). Proventriculus, gizzard and intestine were collected in 10 % neutral buffered formalin and processed as per routine histopathological techniques (Luna 1968) and stained as 5 mm thick tissue sections with hematoxylin and eosin and processed for histopathology. Photographs were taken under Olympus microscope with DP25 camera system.

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## Results and discussion

At post mortem examination, nematodes were found inside the lumen of the proventriculus, gizzard and duodenum (Fig. 1). Wall of proventriculus was thickened and mucosa of the proventriculus showed hemorrhagic areas and ulceration. Intestine showed pin point haemorrhages. Four male and six female worms were collected and were identified as *A. galli*. Adult worms were semi-transparent and yellowish white with male and female parasites ranging from 28–42 mm and 56–82 mm, respectively. Light microscopy revealed the presence of three prominent lips, one dorsally and two ventro-laterally located at the anterior end of the worm (Fig. 2a). Internal side of the lip was lined with fine dentines. Club shaped oesophagus without any posterior bulb were also observed (Fig. 2a). Outer surface of the dorsal lips showed cephalic papillae and sensory cephalic pores. The whole body cuticle except the lips was



**Fig. 1** Proventriculus: hemorrhages and ulceration of the glandular mucosa with the presence of nematode

transversely striated or annulated (Fig. 2a–c). Distinguishing feature for both male and female parasites was the tail or the posterior part. A simple straight tail with a ventrally located anal opening was observed in female (Fig. 2c) while male have curved and pointed tail with a prominent circular precloacal sucker and well developed spicules (Fig. 2b) and also showed characteristic cuticular formation.

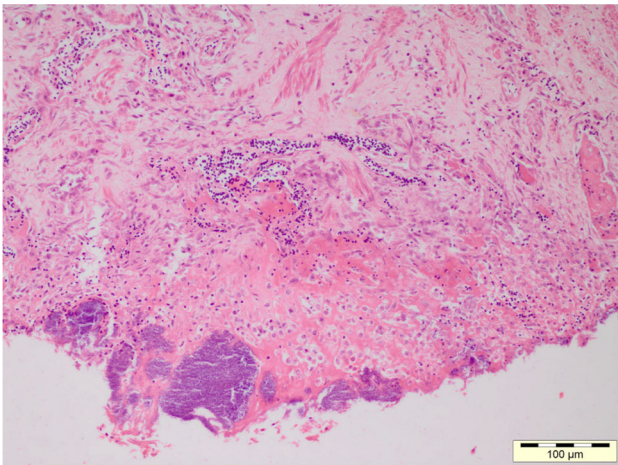
*Ascaridia galli* is the most common nematode of poultry (Ackert 1931; Katakum et al. 2010) having direct life cycle. Ramadan and AbouZnada (1992) have described the detailed morphological features of *A. galli*. In the present investigation, similar structural features for the parasite were recorded. Histopathologically, proventriculus revealed ulcerative proventriculitis characterized by denuded superficial epithelium, sub-epithelial hemorrhages and underlying fibrosis (Fig. 3). Lymphocytic and monocytic cell infiltration(s) in the underlying stroma was also observed. Few proventricular glands showed areas of fibrosis and mixed cell infiltration occasionally. No larvae per se discernible in the tissue. Secondary bacterial infection was observed in the ulcerated area.

Parasitic proventriculitis is not a common observation in the poultry birds and has been reported by few researchers group. In chickens denuded mucosa and inflammatory changes in the proventriculus due to *Cryptosporidium* infection has been reported (Goodwin et al. 1996). Similarly, purulent necrotizing proventriculitis due to *T. gondii* was reported in chicken (Henderson et al. 1988). In several avian species, proventriculus infection with *D. nasyta* (Goble and Kutz 1945) and *Tetrameres* species (Norton and Ruff 2003) has been reported. However the current study reports parasitic proventriculus caused by *A. galli* which is a rare and unique finding till date.



**Fig. 2** Light microscopic features of *A. galli*. **a** Light microscopic photograph of the anterior portion of the parasites showing prominent lips and oesophagus. **b** Posterior portion of the male showing two

caudal spicules (arrow head) and circular pre-cloacal sucker (arrow). **c** Posterior end of the female showing straight and pointed tip tail and anal aperture (arrow head)



**Fig. 3** Proventriculus: denuded superficial epithelium, sub-epithelial hemorrhages and underlying fibrosis were observed along with lymphocytic and monocytic cell infiltration(s) in the underlying stroma. Secondary bacterial infection was also observed in the ulcerated area (H & E, Scale Bar 100  $\mu$ m)

Proventriculus acts as a nidus for hatching of the ingested infective eggs to larvae. The larvae were then localized and burrowed into the duodenal mucosa indicating an early mucosal phase (Luna-Olivares et al. 2012). The adult parasite lives in the lumen of the small intestine (Ackert 1931). Tissue-dwelling larvae cause extensive destruction and erosion of the epithelium as compared to that of adult worms. It also stimulates the proliferation of mucus secreting cells causing adhesion of villi (Ackert and Herrick 1928; Tugwell and Ackert 1952; Ikeme 1971a). Ikeme (1971b) reported that adult worms migrated up and down the intestinal lumen, when present in large numbers. Soulsby (1986) reported that burrowing of parasites in the intestinal mucosa reveals inflammatory lesions and focal hemorrhages.

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