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RESEARCH ARTICLE

Ultra Structural Pathology Of Paratanaisia Infection In Domestic Pigeon Columba Livia

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ABSTRACT

A study was conducted to observe ultrastructural pathology of *Paratanaisia* sp in kidney of domestic pigeon. *Paratanaisia bragai* is a digenetic trematode, which possess tegumental spine all over the body surface. The parasite has been found to resides in the renal collecting tubules and medullary tubules of birds. SEM studies of the parasite infected areas confirmed dilatation of the medullary duct, flattening of the epithelial cells, impression of tegumental spines on the dilated wall of the duct and deposition of blood cells and amorphous materials.

INTRODUCTION

The role of kidney in avian is similar to the mammalian kidney and perform the basic function i.e; filtration, excretion or secretion and absorption. But morphologically the shape and size of the avian kidney varies greatly than the mammalian kidney. The urinary organs of birds consist of paired kidneys and ureters, which helps in the transportation of urine to the urodeum of the cloaca.

Unlike mammalian kidney, avian kidney are lobulated, where each lobule has a cortex and medulla. Nephron is the functional unit of kidney. Avian kidney have two different types of nephrons i.e; reptilian type which are located in the cortex and loops of Henle are absent . The other one is mammalian type, which are located in the medulla and consist of Henle's loop. Nephrons filter the blood plasma to eliminate waste products. Other than mammals, birds are the only vertebrates that conserve body water and producing urine osmotically more concentrated than the plasma (McWhorter *et al*, 2004).

Renal dysfunction is common in birds and can be caused by a number of pathogens. The most common cause includes, virus (Pox virus), bacteria (Salmonella), fungus (Aspergillus), toxins (Diclofenac), deficiency of nutrient or vitamin (Hypovitaminosis-A), obstruction (Urinary stone), overproduction of metaboloites (Gout) etc.

Along with the above mentioned microscopic pathogen, there are also a number of parasite (*Ascaridia* , *Davaenia*, *Coccidia*, *Raillietina* and *Echinostoma* sps. (Phangcho, 2001). *Paratanaisia bragai* a kidney dwelling trematode was evaluated to be of great pathological significance in pigeon (Borah *et al*., 2009). *Paratanaisia bragai* is localized in the medullary collecting ducts and ureters mostly of galliformes, columbiformes and anseriformes birds from the American continent and the Phillipines (Maldonaldo, 1941; Travassos*e et*

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al., 1969; Mena *et al*., 1986; Fedynich *et al*., 1996). The parasite posseses toothed spine of various shape and sizes all over the body surface due to which it has been considered to pathogenic in the residing organ. Clinically, the bird infected exhibits excretion of large amount of uric acid, characterised by white, chalky material. Grossly the ureter are distended with uric acid and gross parasite (Borah *et al*., 2009).

MATERIALS AND METHODS

Collection of samples

For ultrastructural pathology study, kidney of pigeon naturally infected with *Paratanaisia* sp. were collected from fresh carcass during post-mortem examination and fixed in 3 % Gluteraldehyde for further processing.

Processing and preparation of samples

Representative tissue samples were cut into pieces of 2 cu mm in sizes, focussing on the areas where the parasites were lodged. Parasite affected tissue pieces were fixed in 3% gluteraldehyde and kept at 4^0C for 4 hours. Thereafter, the samples were kept in 0.2 M cacodylate buffer for 3 changes of 15 minutes each. Samples were dehydrated in ascending grades of acetone, i.e., 30% 50%, 70%, 80%, 90%, 95% and 100% followed by dry acetone for 2 changes of 15 minutes each. Samples were finally dried in tetramethylsilane (TMS) as per the method of Dey (1992). Dried samples were mounted on brass stubs and coated with gold in an ion sputter (JEOL, Fine Coat). The coated samples were viewed under a scanning electron microscope at an accelerating voltage of 15-20 kV and the images were recorded.

RESULTS

In the medullary part of renal parenchyma, extensive dilatation of the medullary duct were present (Fig. 1). At higher magnification the surface of the medullary duct was found smooth and dilated (1). Occasionally there were impressions of the tegumental spines of the parasites on the wall of parasitic cavity (Fig. 2). At several places in the renal tubule there were haemorrhages as well as deposits of amorphous materials (Fig3).

Ultra structural image of pigeon kidney infected by Paratanaisia bragai

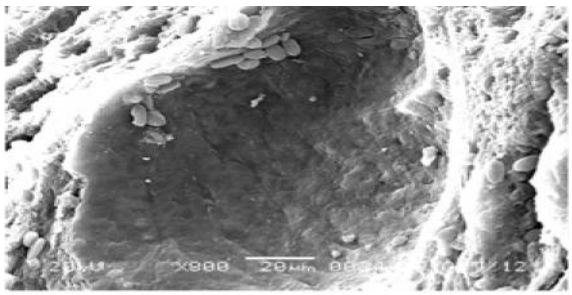

Figure 1 SEM image of a dilated medullary duct with smooth surface in the duct. scale bar: 20µm

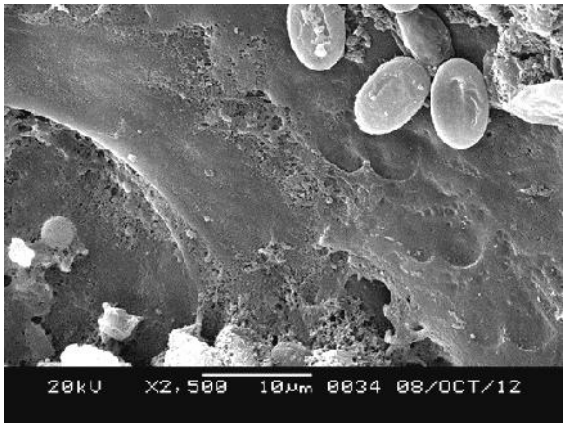

Figure 2 SEM image of a dilated medullary duct with (arrow) of the parasites scale bar: 10 µm

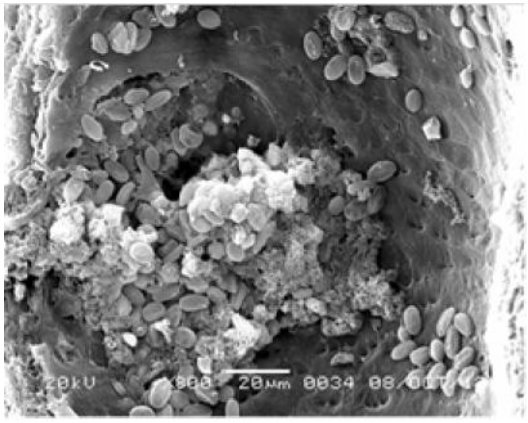

Figure 3 SEM image of the medullary part of renal parenchyma showing haemorrhage in a medullary duct. Scale bar: 20 µm.

DISCUSSION

Scanning electron microscopy of pigeon kidney infected with *Paratanaisia* sp. revealed extensive dilatation of the medullary ducts (Fig. 1). The lining surface was smooth and dilated (Fig. 1). Presence of haemorrhage and deposition of amorphous materials were found in several collecting tubules and medullary ducts (Fig. 3). Survey of literature revealed no previous record of such studies from this part of the country. Hence, the present findings could not be compared with any such relevant findings. There were impressions of parasitic tegumentary spines on the wall of dilated ducts (Fig.2). This further strengthens the view that the parasite imposes pressure atrophy on the wall of the ducts. There were evidences of haemorrhage in the medullary ducts (Fig. 3). Elsewhere, the surface tegumentary spines of *Paratanaisia* have been characterized and described. It was assumed that, the possession of numerous sharp toothed tegumentary spines injures the ductal wall while the parasite makes a move and initiates haemorrhage and other cellular responses due to it. Further, the breach of ductal wall facilitates deposition or leakage of uric acid that flowed out through cloaca. This certainly requires further detailed studies. However, the collective evidences point out that, the parasite under investigation has enormous capability of destroying renal tissues.

CONCLUSION

The ultra structural pathology of *P. bragai* was recorded for the first time in the present study from this part of the country.The presence of multi toothed spine on the tegument of the parasite and the degree of damage caused to a vital organ i.e; renal collecting tubules clearly depicts the pathogenicity and significance of the parasite regarding the health of birds.

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