

Pathomorphology of *Trichosomoides crassicauda* in a Wistar rat

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ABSTRACT

Trichosomoides crassicauda is a nematode parasite inhabiting the urinary bladder of wild and laboratory rats. Its unique feature is the presence of the male worm permanently embedded within the uterus of the female worm. On gross examination, no specific lesions could be detected in the urinary bladder. Histopathological examination of urinary bladder revealed epithelial hyperplasia, mucosal thickening and multiple cut sections of parasite. Within the lumen and mucosa well-developed eggs and female parasites were embedded in the epithelium of urinary bladder with no inflammatory reaction around the parasite. Based on the gross examination and histopathological findings, the case was identified as incidence of *Trichosomoides crassicauda* in rat.

Keywords: Nematode, Urinary bladder, Embryonated eggs, Epithelial hyperplasia

INTRODUCTION

Rats are widely used as laboratory animals and are known to harbour several parasitic organisms. *Trichosomoides crassicauda* is a helminth that inhabits the urinary bladder of rats. It is a slender, hair like nematode generally considered non-pathogenic and these parasites have been documented in both laboratory and in Wistar rats¹, Long-Evans rat² and Albino rats^{3,4}. In addition to urinary bladder, the parasite has been noticed in other organs such as uterus, kidney and lungs⁴. *T. crassicauda* exhibits sexual dimorphism; The female worm measuring about 8-15 mm is typically found free in the lumen of the bladder and resides in the urinary bladder while male worm is very short (1-2 mm) and located within the uterus of the female this intrauterine localization of the male parasites helps in identifying the species^{5,6}.

The male worm resides within the uterus or vagina of the adult female rats and this parasite has direct life cycle and transmission occurs through ingestion of embryonated eggs contaminated with feed and water which are excreted through the urine of infected rats. After ingestion, the larva hatch in the stomach and migrate to the lungs through the body cavities or via the bloodstream. Subsequently, the larvae reach the kidneys through the blood stream and eventually migrate to the urinary bladder through the ureters⁷. Because of the larval migration, it induces granuloma formation and it produces granulomatous lesions in the urinary bladder⁶. This report documents the incidental findings of *T. crassicauda* in a Wistar rat.

MATERIALS AND METHODS

Rat tissues from sub-acute toxicological study were submitted to Regional Histopathology Laboratory for Animal Disease Diagnosis, Department of Veterinary Pathology, Veterinary College and Research Institute, Namakkal for histopathological examination. The formalin fixed rat tissue samples were processed, embedded and cut into 4 µm thickness and stained with Haematoxylin and Eosin (H & E) for histopathological examination⁸.

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RESULTS

The gross pathological examinations revealed no specific lesions in the urinary bladder. However, there were much pronounced histopathological lesions noticed in the urinary bladder. The histopathological examination of urinary bladder revealed presence of female worms in the lumen of the urinary bladder (Fig. 1), female worm embedded in the mucosa with gravid uterine segments in the urinary bladder (Fig. 2). Epithelial hyperplasia, mucosal thickening with no inflammatory reaction around the parasite were observed (Fig. 3). Hyperparasite of the male worm noticed in the uterus of the female worm (Fig. 4) embedded in the mucosa.

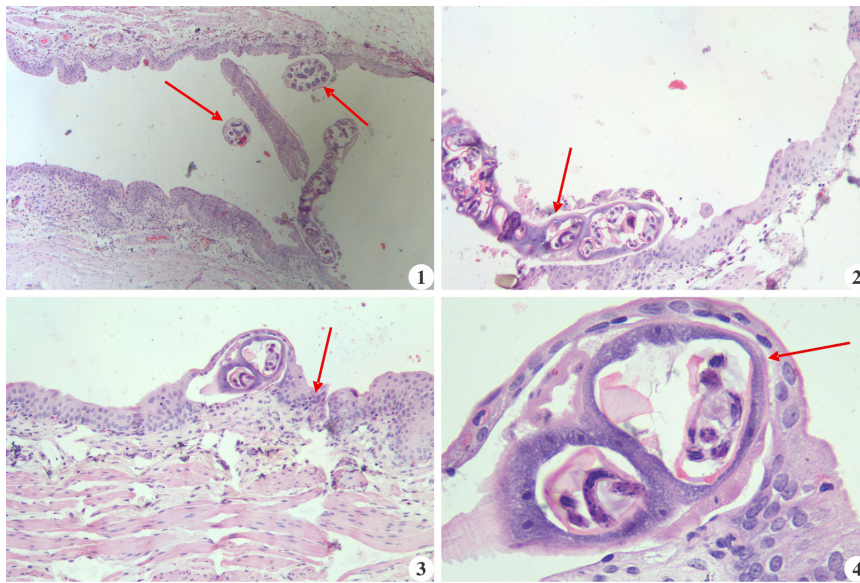


Fig. 1. Sections of female worms (red arrows) present freely in the lumen of urinary bladder (H&E x 40); **Fig. 2.** Urinary bladder revealing adult female worm embedded in the mucosa with gravid uterine portions distended with numerous eggs (H&E x 100); **Fig. 3.** Female worm completely embedded into the transitional epithelium of the urinary bladder with no inflammatory reactions (H&E x 100); **Fig. 4.** Urinary bladder revealing male parasite in the uterus of female adult worm (H&E x 400)

DISCUSSION

Experimental studies in various fields of biological and medical sciences mostly rely on laboratory animals. Among these, rats are the second most widely used experimental animals worldwide. On account of this, rats serve as valuable animal models in multiple areas of biomedical research *viz.*, pharmacology, cancer research, toxicology and immunology⁹. However, the possible interactions between laboratory animals and pathogens often occur without any apparent clinical signs, which may influence the experimental outcomes and thereby, compromising the reliability of the results obtained⁶. In the present study the rat was utilized as an animal model for sub-acute toxicological investigations and the presence of this parasite in the urinary bladder was observed as an incidental finding.

Parasites are recognized as the most frequently encountered pathological agents macroscopically¹⁰. However, in the present study, there was no adult worms noticed in the urinary bladder, the impact of *T. crassicauda* on the urinary bladder was assessed only by histopathological examination.

The presence of the nematodes within the urinary bladder has been related with the pathological conditions such as cystitis, urolithiasis, epithelial metaplasia and neoplastic alterations^{2,11}. However, in the present study there was no such apparent clinical signs and also no inflammatory reaction noticed which is in accordance with the earlier reports of author^{3,4}. This might be due to the low pathogenicity of the parasite and its localized habitat within the urinary bladder and the host capacity for physiological adaptation. In addition, the parasitic infection causes mild or no inflammatory responses that are insufficient to produce overt clinical signs.

The nematodes alter the structural integrity of the epithelium lining the bladder by penetrating the glycosaminoglycans layer and localizing within the mucosal tissue. Thereby, the invasion of the parasite is associated with

the mild inflammatory response and minimal histopathological alterations³. The histopathological examination of urinary bladder revealed presence of female worms in the lumen of the urinary bladder and in multiple areas completely embedded into the transitional epithelium, epithelial hyperplasia, mucosal thickening with no inflammatory reaction around the parasite and hyperparasite of the male worm noticed in the uterus of the female worm. These histopathological lesions were very well correlated with earlier findings of the authors^{1,3,4,6}.

The hyperplasia of the bladder epithelium provides viable environment for the adult *T. crassicauda* parasite, thereby limiting the effective immune response in the host during the life cycle of the parasite⁷. The maturation of the worm is associated with the irritation of the urinary bladder resulting in the degenerative changes in the epithelium lining the bladder⁴ and this finding is in contrast with the present report. There was no much degenerative change in the bladder mucosa. This might be due to the host physiological adaptation to the parasite.

CONCLUSION

T. crassicauda is a common bladder nematode in rats. Usually, it is subclinical, but it may cause urinary pathology. Diagnosis is mainly by examination of urine and histopathology. The presence of this parasite in rats is of considerable veterinary and experimental relevance due to its potential in affecting animal health and experimental research outcomes.

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