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Short Communication

CECOCOLIC INTUSSUSCEPTION IN AN ASIAN ELEPHANT (*ELEPHAS MAXIMUS*) IN SRI LANKA ASSOCIATED WITH CHRONIC HEPATO-INTESTINAL SCHISTOSOMIASIS: FIRST CASE REPORT

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**Abstract**

A 25 year old female captive Asian elephant weighing approximately 3000kgs died and was subjected to a complete necropsy within 5 hours *post mortem*. Grossly, the elephant had sub-cutaneous edema, cecocolic intussusception and ascites. Histopathological examination revealed multifocal, granulomatous, portal phlebitis in the liver, multifocal, granulomatous, peri-portal hepatitis with marked portal and perisinusoidal fibrosis, and multifocal granulomatous colitis with intralesional *Schistosoma* eggs. To our knowledge, this is the first report of cecocolic intussusception in an Asian elephant associated with *Schistosoma* infection.

**Keywords:** *Elephas maximus*; Asian elephant; Intussusception; Schistosomiasis; Sri Lanka; *Bivitellobilharzia nairi*

**Case Report**

A complete necropsy was carried out within 5 hours *post mortem* on a 25 year old female Asian elephant weighing approximately 3000kgs living in the Elephant Orphanage in Pinnawala, Sri Lanka (7.3006° N, 80.3883° E). The animal had died despite treatment for chronic indigestion and progressive emaciation of approximately one month.

Sections from all the major organs and representative samples from conspicuous lesions were fixed in 10% neutral buffered formalin, dehydrated in a graded series of ethanol to xylene, embedded in paraffin and sectioned at 4 micrometers. The sections were stained with hematoxylin and eosin (HE) and Masson's Trichrome Stain.

Macroscopically, there were no visible subcutaneous or visceral fat reserves. The orbital fossae were depressed and the wings of both ilea were prominent, all of which are indicative of poor nutritional condition (Fig. 1a). The elephant had died in lateral recumbancy and there was marked diffuse subcutaneous edema of the ventral body wall. The peritoneal cavity contained over five liters of yellow turbid fluid (Fig. 1b). The liver was markedly congested and diffusely enlarged; there were multifocal to coalescing white foci on cut surfaces (Fig. 1c.). The entire cecum, approximately one meter in length, had everted into the proximal colon (Fig. 1d.) and the associated caecal

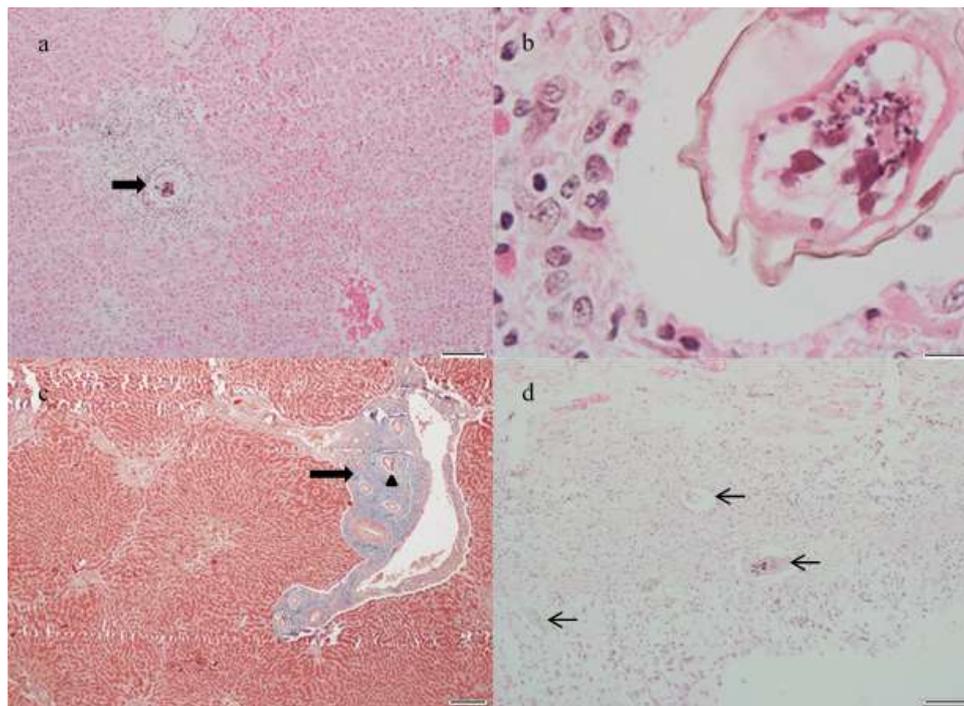
submucosa was severely edematous. The feces were loose and watery.

Microscopically, the walls and adjacent connective tissue of multiple portal venules and peri-portal areas were infiltrated by inflammatory cells, predominantly macrophages, plasma cells, lymphocytes and a few eosinophils. Portal triads and perisinusoidal spaces were expanded by deposition of a collagenous stroma (as evident by Masson's trichrome stain) and bile ducts were often multiple and tortuous, indicative of severe chronic portal and perisinusoidal fibrosis and biliary hyperplasia. The wall of the cecum was diffusely edematous and the submucosa was often infiltrated by moderate numbers of eosinophils. There was marked hemorrhage and edema throughout the submucosa. There were some microscopic hemorrhages and ulcerations of the mucosa. The colonic and the cecal epithelia were diffusely attenuated and absent in some areas. The muscularis mucosa was diffusely very thick. Multiple areas of the colonic submucosa and muscularis mucosa were infiltrated by macrophages, epithelioid cells, giant cells, lymphocytes and plasma cells (Fig. 2a).

In both the liver and the colon, the centers of granulomas often contained non-operculated, thin, brown-walled eggs with a terminal spine and containing a ciliated miracidium, consistent with eggs of *Schistosoma* sp. (Parris, Michie et al. 2014) (Fig. 2b and 2d).



**Fig. 1:** (a) Emaciated elephant carcass (b) Ascites (arrow head), (c) White, multifocal to coalescing portal fibrosis (arrow) and (d) Intussusception: the caecum (arrow) is everted into the lumen of proximal colon



**Fig. 2:** (a) Granulomatous phlebitis with intralesional *Schistosoma* eggs (arrow) (HE) (Bar = 100µm), (b) High power view of a *Schistosoma* egg with ciliated miracidium (HE) (Bar = 20µm), (c) Portal fibrosis (arrow) and biliary hyperplasia (arrow head) (Masson's trichrome stain) (Bar = 200 µm) and (d) *Schistosoma* eggs in the sub-mucosa of the colon (thin arrows) (HE) (Bar = 100µm)

The pathological findings described here are consistent with those of human hepatic and intestinal schistosomiasis (Andrade, 1987). Ascites likely resulted from portal hypertension caused by hepatic portal and perisinusoidal fibrosis, perhaps enhanced by protein malnutrition associated with the prolonged clinical illness. The inflammatory lesions of the colon and in the cecum were implicated as the cause to the cecocolic intussusception, similar to previously described cecocolic intussusception in horses with parasite-induced intestinal inflammation (Mair *et al.*, 2000).

The Asian elephant in Sri Lanka is categorized as an endangered species in the International Union for Conservation of Nature (IUCN) red list (Choudhury *et al.*, 2008) and its population is rapidly declining due to human-elephant conflicts and habitat destruction in South East Asia. Information on infectious and non-infectious diseases of this species is needed to better understand health issues that may pose additional risks to the species.

The schistosome trematode, *Bivitellobilharzia nairi*, infects Asian elephants (Rajapakse *et al.*, 2003; Vimalraj *et al.*, 2012; Rajapakse *et al.*, 2013) whereas *B. loxodontae* infects African elephants (Brant *et al.*, 2013). This paper contributes to understanding health issues and extends the limited literature of *Schistoma* infection in Asian and African elephants. To our knowledge, this is the first report of cecocolic intussusception in an Asian elephant associated with hepato-intestinal schistosomiasis.

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