

## Concurrent infection of *Taenia taeniaeformis* and *Isospora felis* in a stray kitten: a case report

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**ABSTRACT:** The present report describes a unique case of acute diarrhoea, dehydration and weakness in a stray female kitten due to concurrent infection of *Taenia taeniaeformis* and *Isospora felis*. Death occurred before any treatment could be attempted and postmortem examination revealed the presence of live tapeworms embedded in the mucosa of the small intestine. The tapeworms were identified as *Taenia taeniaeformis* by Scanning Electron and Light microscopy. The uterus of the tapeworms was filled with eggs. The intestinal contents were yellow in colour and upon their examination by faecal floatation the presence of *Isospora* oocysts was revealed. On histopathological examination, necrotic enteritis along with endogenous tissue stages of *Isospora* spp. were observed in the intestine. The other cats in the area were found to pass eggs and/or gravid segments of *T. taeniaeformis* in their faeces. Infection with the metacestodes (*Cysticercus fasciolaris*) of this indirectly transmitted parasite was found in the liver of the intermediate hosts, i.e., the wild rats *Bandicota bengalensis*.

**Keywords:** acute diarrhoea; coccidian; necrotic enteritis; tapeworm

Apicomplexan parasites of the family Eimeriidae are found mainly intracellularly in the cells of the intestinal epithelium and some are associated with attacks of diarrhoea. *Isospora felis* is a coccidial protozoan that infects cats primarily through ingestion of sporulated oocysts or sporozoite-infected mice. In cats it is not thought to be a common problem and is usually seen only in naturally infected kittens in which other disease causing agents may be present (Long, 1990). *Taenia taeniaeformis* (Cestoda: Taeniidae) infects mainly carnivores of the families Felidae, Canidae and Mustelidae, including domestic cats and dogs (Nichol et al., 1981). The intermediate hosts of *T. taeniaeformis* include the mouse, rat, cat, muskrat, squirrel, rabbit, other rodent, and bat. Also, some sporadic cases of human infection have been reported from Argentina, the former Czechoslovakia, Denmark and Taiwan (Nichol et al., 1981; Ekanayake et al., 1999). The present case is the unique description of death in a stray female kitten caused by acute diarrhoea due to concurrent infection of *T. taeniaeformis* and *Isospora felis*. To our knowledge, this is a rare case of its kind in the

field, describing as it does concurrent cestode and protozoan infection.

### Case report

The kitten was severely anaemic and died before any treatment could be attempted. Postmortem examination of the kitten revealed the presence of live tapeworms in the small intestine. The intestinal contents were yellow in colour and there was catarrhal enteritis. The tapeworms were embedded in the mucosa of the intestine and included seven mature tapeworms measuring  $35 \pm 2.16$  cm and four immature worms measuring  $16 \pm 1.41$  cm. The worms were gently taken out of the intestine and placed in normal saline solution (NSS) for proper stretching and later fixed in 10 percent neutral buffered formalin for preservation. Morphological study of glutaraldehyde fixed specimens was performed by scanning electron microscopy. The tapeworms were identified as *T. taeniaeformis* based on the presence of double rows of hooks



Figure 1. Scolex of *Taenia taeniaeformis* showing double row of hooks and unarmed suckers (SEM)



Figure 2. Gravid segment of *Taenia taeniaeformis* showing branches of eggs

on the scolex (Figure 1). The scolex is distinctly large, bearing four lateral suckers and a rostellum armed with double and alternating rings of large and small hooks, arranged in a circular pattern with a large double circlet of 30 to 40 hooks. The hook size is 0.36–0.44 mm for the anterior crown and 0.25–27 mm for the posterior one. This clearly differentiates *T. taeniaeformis* from all other *Taenia* species microscopically.

The gravid segments were filled with eggs (Figure 2). Histopathologically, in H & E stained sections endogenous stages of *I. felis* (which included mainly oocysts) were observed in the intestine (Figure 3). Histopathology of the small intestine revealed gastroenteropathy associated with mucosal hyperplasia, and there was proliferation of submucosal glands and severe lymphoid follicular hyperplasia in the duodenum.

Examination of the intestinal contents by faecal floatation (using a saturated solution of sodium chloride) revealed coccidian oocysts, which were identified as *I. felis* (Long, 1990) (Figure 4). *I. felis* oocysts are the largest of all the feline coccidia when compared with *I. rivolta* and *Toxoplasma gondii* (Dubey, 1993). Other stray cats in this area were also found to pass eggs (Figure 5) and/or gravid segments of *T. taeniaeformis* in their faeces.

Cats acquire *T. taeniaeformis* infection from scavenging rodents in which the larval stage, i.e., *Cysticercus fasciolaris* is encountered (Bowman, 1999). The wild rats in the area (*Bandicota bengalensis*) were scarified and were found to be infected

with metacestodes of *T. taeniaeformis* (Singla et al., 2003). The infection rate was found to be 25.7 percent. Histopathologically, the larvae in rats were found encapsulated in liver parenchyma. A report which details how humans may also acquire *T. taeniaeformis* infection by consuming food infected with cat faeces or by accidental ingestion of worms with food points to the zoonotic importance of this organism (Ekanayake et al., 1999). Monospecific

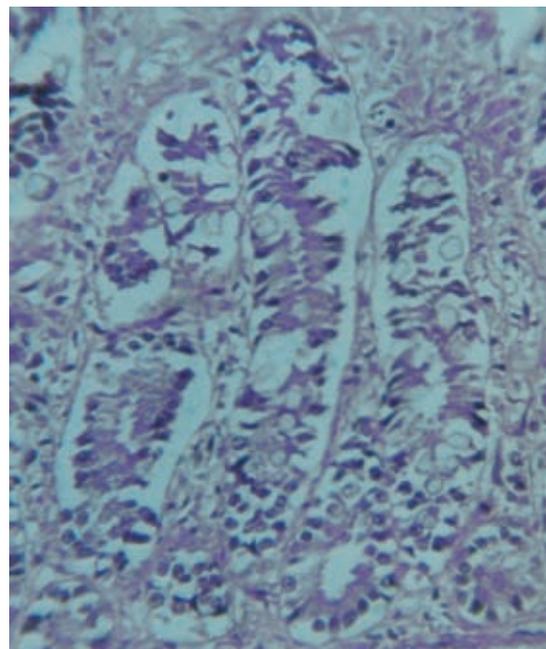


Figure 3. Section of intestine showing endogenous stages of *Isoperis felis*

Figure 4. Sporulated oocyst of *Isospora felis*Figure 5. Eggs of *Taenia taeniaeformis*

infections of *I. felis* do not produce clinical disease in cats. However, clinical coccidiosis may be found in young cats due to malnutrition, weaning stress and concurrent infections, which may reactivate latent infections (Dubey, 1993).

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