Alveolar hydatid disease (*Echinococcus multilocularis*) in a dog from southern Ontario

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A 2-year-old, male, castrated Boxer dog was presented to a veterinary clinic in southern Ontario for anorexia, lethargy and reluctance to move. The dog exhibited tachycardia, tachypnea and abdominal pain. Radiographs revealed loss of serosal detail throughout the abdomen. Significant hemoabdomen was observed during exploratory laparotomy, with active bleeding originating from a large, tan, nodular, space-occupying ~10 cm diameter lesion in the liver (Figure 1). The liver lesion had eroded hepatic vessels resulting in uncontrollable hemorrhage. Given the poor prognosis, the owner elected euthanasia.

Histologically, the liver lesion was a multiloculated cystic structure composed of fragmented hyaline membranes, necrotic debris, mineralized granular material, and very severe eosinophilic granulomatous inflammation (Figure 2). The lesion was suspected to be an intermediate stage of a cestode parasite although protoscolices were not found in the lesion despite examination of numerous sections.

PCR amplification and sequencing, along with PAS staining, performed on formalin-fixed tissue at the Institut fur Parasitologie (Bern, Switzerland), confirmed that the liver lesion is an alveolar hydatid cyst (metacestode) of *Echinococcus multilocularis*.

*E. multilocularis* is a zoonotic tapeworm found in Canada, the United States and Europe. In Canada, *E. multilocularis* is endemic in wildlife in the northern tundra zone of the Canadian arctic as well as the southern regions of Manitoba, Saskatchewan, and Alberta. Alveolar hydatid disease in a domestic dog caused by a European strain of *E. multilocularis* was also recently reported in British Columbia. **The Boxer dog in this case report had no reported travel history, suggesting that *E. multilocularis* is also present in Ontario.**

Foxes, and to a lesser extent coyotes, wolves and wild felids, are the principal definitive hosts wherein the adult tapeworm resides in the small intestine. Eggs passed in the feces of the definitive host are immediately infective for intermediate hosts. Within the intermediate host (mainly rodents such as voles, lemmings, and deer mice), the metacestode stage of *E. multilocularis* is an alveolar hydatid cyst that develops most often in the liver. Progressive budding and expansion of the cyst causes severe tissue damage and may also result in metastatic spread of metacestodes to other tissues. Domestic dogs are definitive hosts for the parasite (i.e., the adult tapeworm develops in their small intestine) but, in rare circumstances, may also develop the intermediate stage in their liver.

**Humans are incidental hosts and may develop rare and potentially life-threatening alveolar hydatid cysts following inadvertent ingestion of infective eggs.** These human infections are more commonly associated with shedding of eggs in dog feces rather than feces of wild canids resulting in infected domestic dog fecal-oral contact with humans (particularly children). To date, no zoonotic infections have been detected in association with this particular case.

Figure 1. Alveolar hydatid cyst of *Echinococcus multilocularis* forming a large destructive lesion in the liver of a Boxer dog. (courtesy of Alicia Skelding)

Figure 2. Multiloculated alveolar hydatid cyst causing extensive liver injury, and with extensive necrosis and chronic inflammation.

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