Hepatic mass in a Labrador retriever

Benoit Rannou[1], Julien Fritz[2], Alexandra Nicolier[3], Mathias Mahinc[4], Eddy Cauvin[2]

[1] Azurvet-Lab, Saint-Laurent-du-Var, France.
[2] Azurvet, Cagnes-sur-Mer, France
[3] VetDiagnostics, Lyon, France
[4] Clinique vétérinaire du Lac, Sevrier, France

Case presentation:
A 2 year-old, female spayed Labrador retriever was presented for the investigation of progressive abdominal distension associated with moderate lethargy but no other specific clinical signs. The dog was living in the French Alps but regularly travelled to the United Kingdom. It was up to date with the usual vaccinations used in France and Great Britain, and was regularly given milbemycin oxime and praziquantel tablets (MILBEMAX ®, Novartis) as prophylactic treatment against endoparasites.

Computed tomography was performed and revealed the presence of a voluminous (approximately 15 × 20 cm) and cavitary mass appearing very mildly and diffusely mineralized in the right cranial abdominal quadrant. The mass was continuous with the parenchyma of the right liver lobes and the intrahepatic portal vasculature and displaced both kidneys, the stomach, the duodenum, and the portal vein. The caudal vena cava was displaced dorsally and to the left. It was severely compressed and partially surrounded by the lesion; invasion of the venous wall was suspected. Two smaller cavitary nodules (measuring 3 mm and 7 mm respectively), bearing the same appearance, were noted in the otherwise normal liver parenchyma.

Hepatic, gastric and pancreaticoduodenal lymph nodes were moderately enlarged (8–10 mm). No peritoneal effusion was detected. The other abdominal structures were within normal limits.

CT examination of the thorax revealed multiple, 3 to 7 mm diameter nodules, distributed throughout the lung field, mostly in the periphery of the lobes.

Fine needle aspirates and needle-biopsies were obtained under ultrasound guidance and submitted for cytologic evaluation (figures 1 to 5)

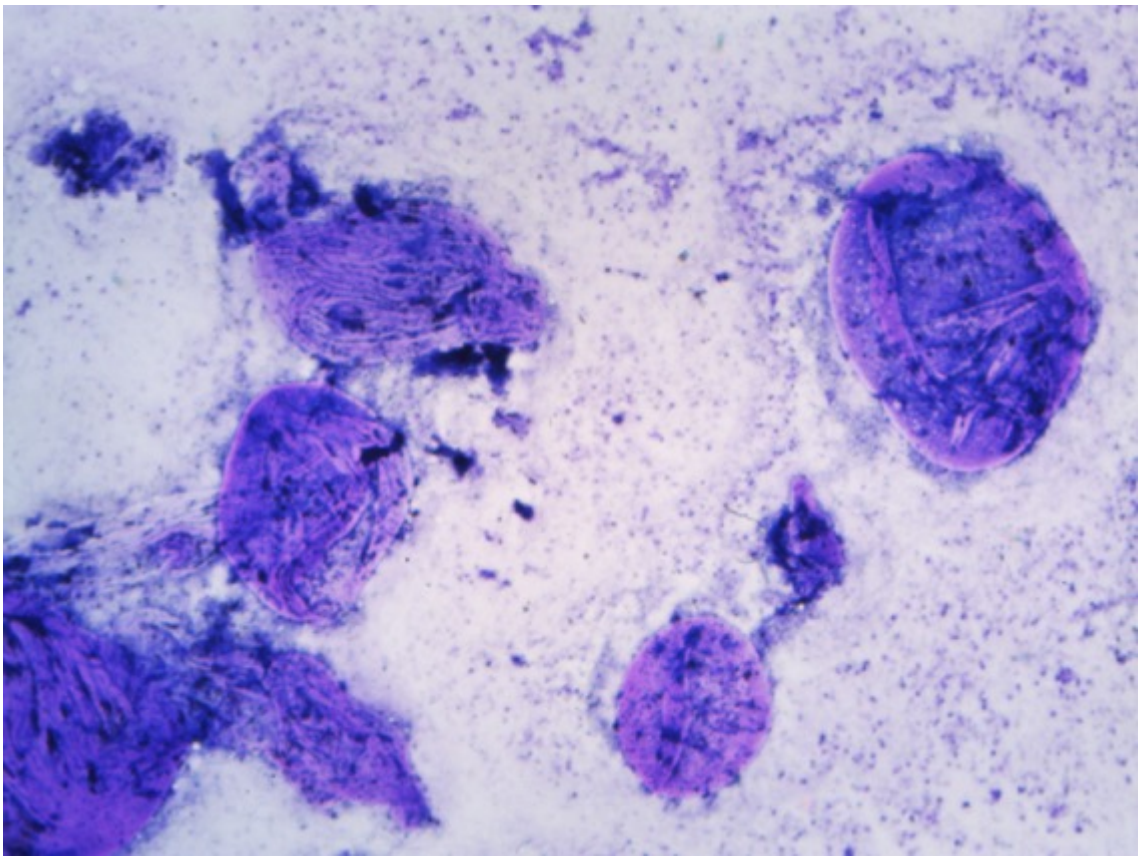

Figure 1: FNA from hepatic mass (x 40 magnification, MGG)
Presence of cyst-like structures with folded pink membrane.

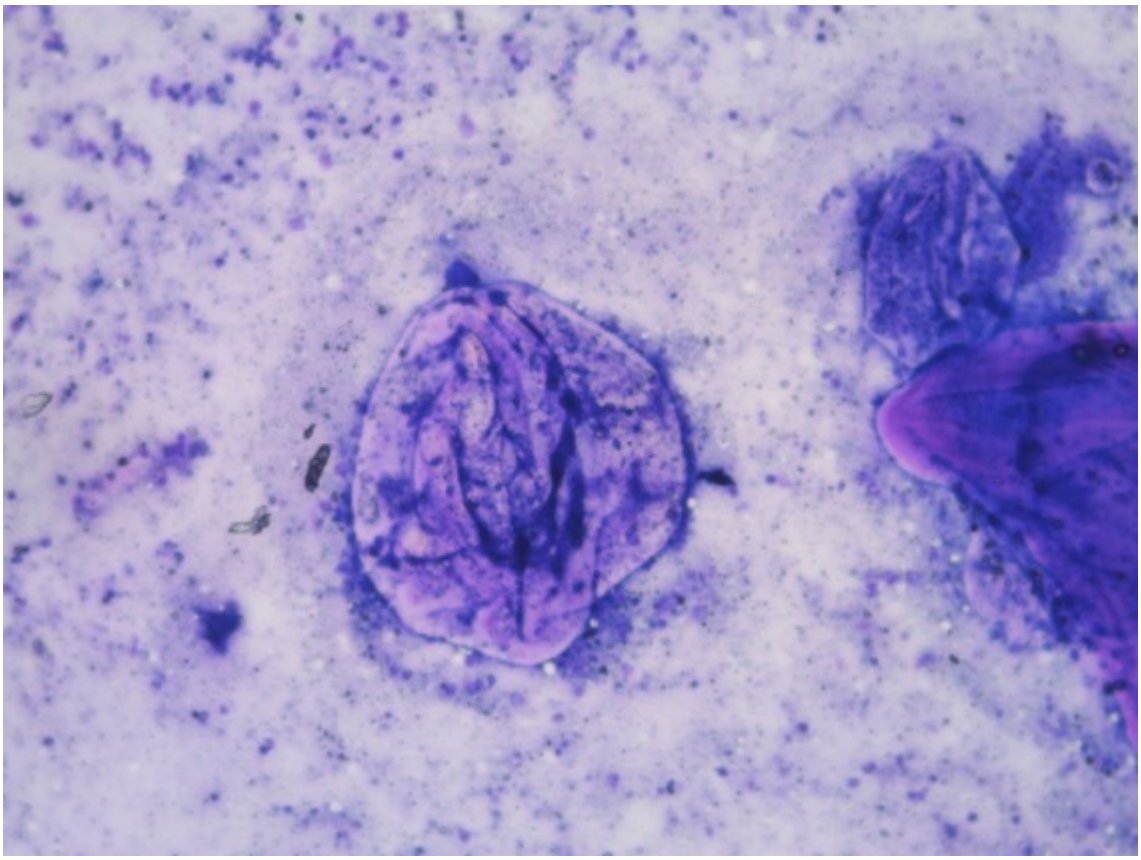

Figure 2: FNA form hepatic mass (x100 Magnification, MGG)

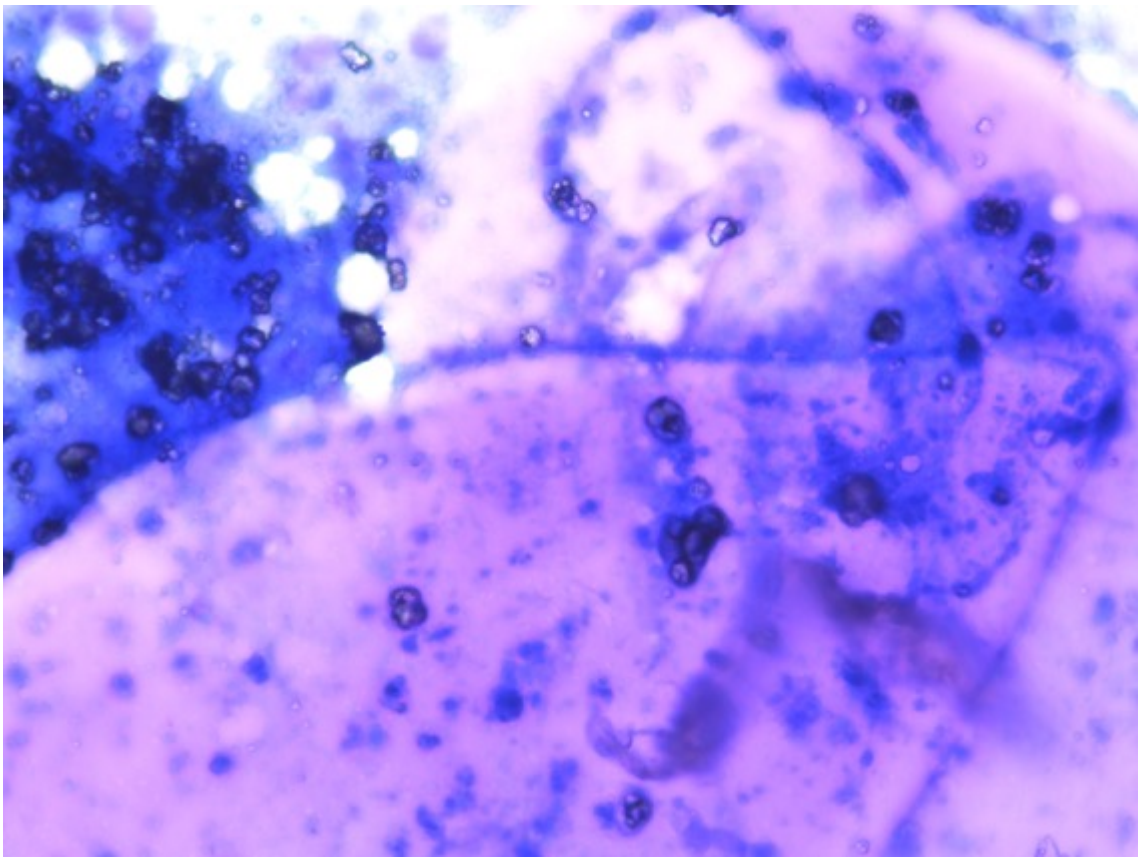

Figure 3: FNA form hepatic mass (x1000 Magnification, MGG)
Presence of calcareous corpuscles.

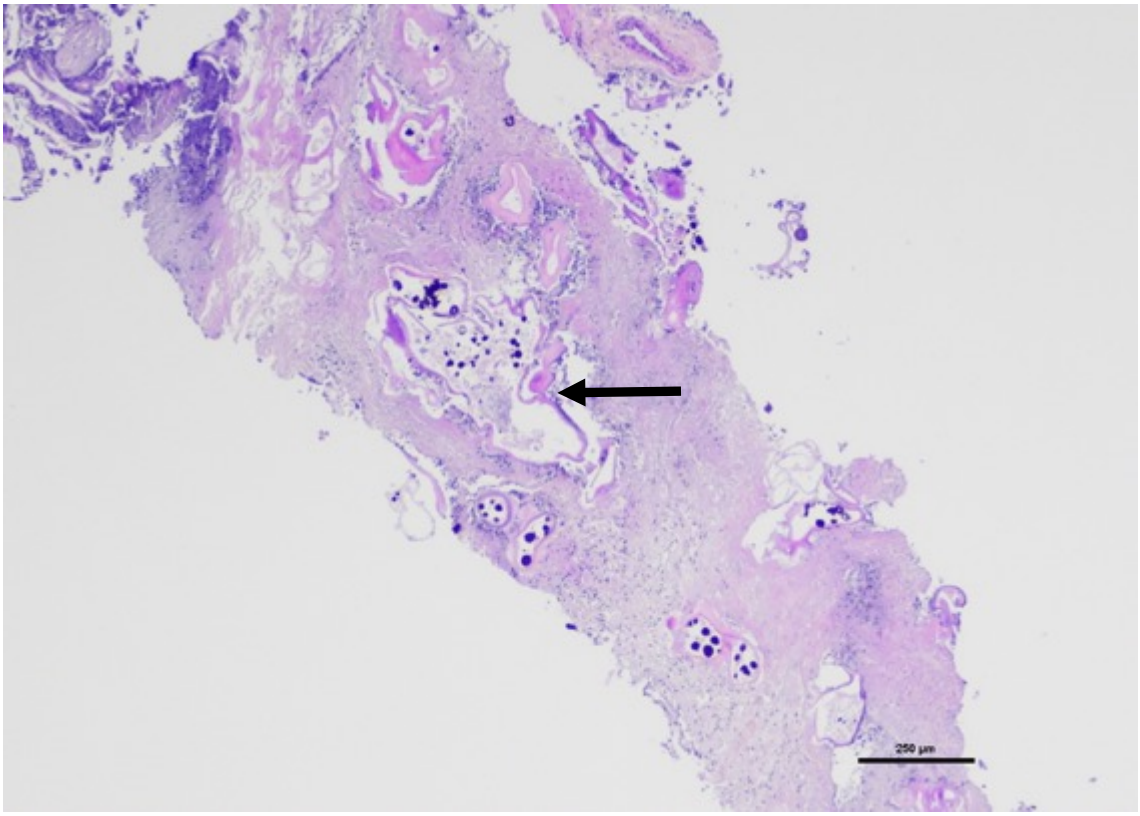

Figure 4: Biopsy from hepatic Mass (x20 Magnification, H&E)
Degenerate cyst (arrow)

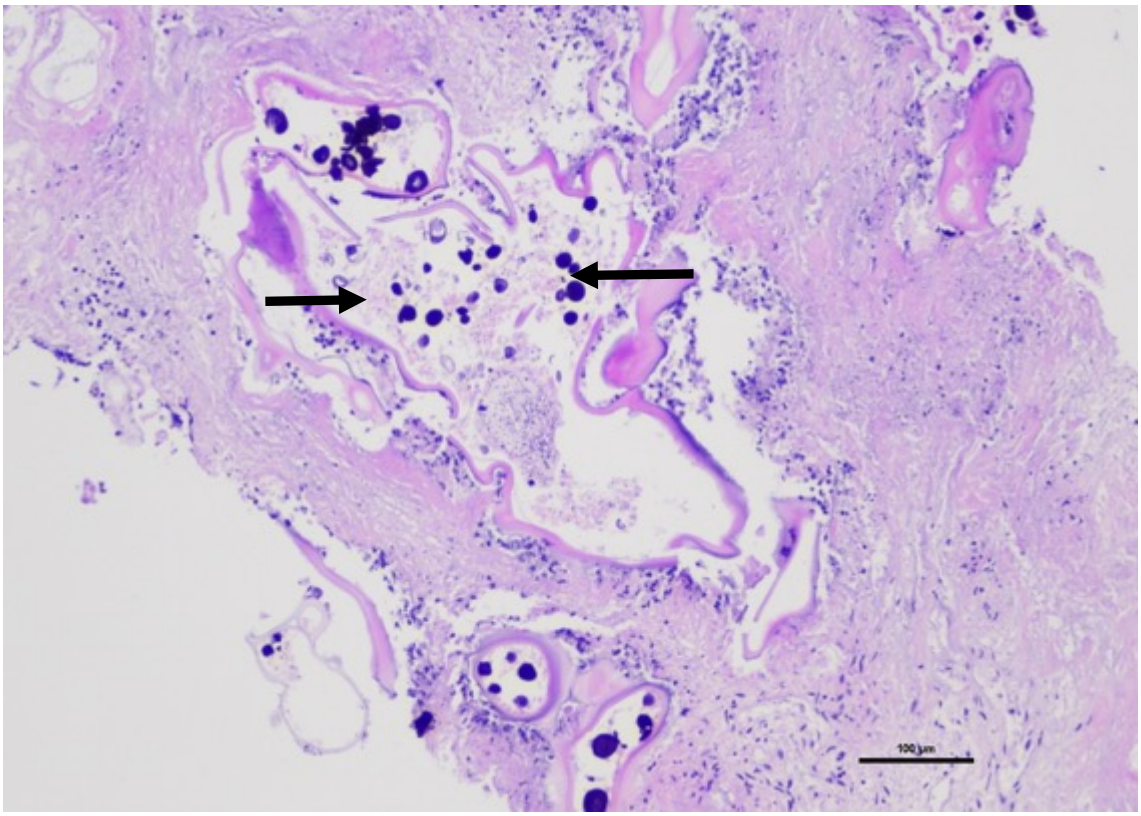

Figure 5: Biopsy from hepatic Mass (x100 Magnification, H&E)
Presence of a thick eosinophilic hyaline membrane layer containing calcareous corpuscles (arrows)

Describe and interpret the cytologic and histologic findings.

Cytologic description:

Smears were of low cellularity and of good quality. On a slightly basophilic and granular background, a mixed inflammatory cell population composed of macrophages, neutrophils and plasma cells was noted as well as numerous large (100 to 300 µm in diameter) cyst-like structures with pale pink, folded membrane. Numerous refractile and globular structures (interpreted as calcareous corpuscles) were also observed in the background and within the large membrane-liked structures.

Cytologic interpretation:
Mixed-cell inflammation with parasitic structures compatible with Echinococcus sp. (metacestode infection).

Histologic description:
Liver biopsies revealed the presence of numerous cysts lined by an eosinophilic thick hyaline membrane-layer containing calcareous corpuscles measuring 5 to 20 µm in diameter. These cysts were surrounded by neutrophils, eosinophils, macrophages, and fibrin. Protoscolices were not identified.

Histologic diagnosis
Granulomatous hepatitis with numerous intralesional degenerate metacestode cysts.

Additional test
A PCR was performed on liver samples collected by fine needle aspiration. It was positive for *Echinococcus multilocularis* and negative for *Echinococcus granulosus*.

Patient Outcome

The owners declined surgical treatment, considering the high risks involved with surgical removal of the mass, vascular implication and also the lung metastatic masses. Medical treatment was therefore implemented, based on the daily oral administration of albendazole 10mg/kg SID for life. Most of the fluid filling the main hepatic cavitary mass was aspirated, in order to decrease abdominal pressure.
Considering the zoonotic risks associated with echinococcosis, a coproscopic examination was performed to ensure that the dog was not excreting any eggs. No *Echinococcus sp*. eggs were found.
The dog was re-examined 8 months after the initial presentation. Follow-up CT examination was performed. The main hepatic cavitary mass had regained a volume similar to that at the initial scan. The two smaller hepatic cavitary nodules had similar dimensions as previously. Pulmonary nodules were still present and yielded a similar size.
The fluid inside the largest cavitary hepatic mass was again aspirated in order to decrease abdominal pressure. The medical treatment was continued.

The dog has remained asymptomatic for 9 month and then demonstrated lethargy and abdominal distention. Due to poor prognosis, owners elected euthanasia. A necropsy was not performed.

Discussion

Echinococcus multilocularis is a zoonotic, tapeworm that occurs in central Europe, much of northern, central and eastern Eurasia and parts of North America [1]. In North America, some authors have reported an increasing incidence of clinical echinococcosis in recent years [2]. Adult parasites reside within the small intestine of definitive hosts, which primarily include wild canids (foxes, coyotes, wolves) and domestic dogs. Intestinal infestation in the definitive hosts is usually asymptomatic. Following the ingestion of eggs by an intermediate host, most commonly small rodents but also occasionally other mammals including canids or man, the immature stage of the parasite hatches, migrates to the liver and develops into alveolar hydatid cysts [10]. This larval stage of the parasite undergoes exogenous budding and behaves like an invasive tumour [9].

The dog presented in this case report was a young (2-year old) adult. Although there have been only few cases reported in domestic dogs [5–13], it would appear that the condition mostly affects young adults. It is unclear whether this is due to immune pathophysiological considerations, behavioural patterns in younger dogs or other causes. A possible bias may be a lack of further (microscopic) investigations performed in older dogs, in which a diagnosis of metastasized malignancy would have been presumed more easily.

In the dog presented in this report, a large, cavitary with mineral opacities hepatic mass was identified along with 2 additional, smaller nodules, both of which had a similar appearance. In a retrospective study of canine alveolar echinococcosis in 11 dogs [8], all animals presented with a large liver mass on radiographs, 5/11 showing multifocal mineral opacities.

Although our case shared many similarities with previously described hydatid liver lesions in dogs, only one other reported dog presented with metastatic spread to the lungs [7]. In our case, there was also suspicion of local aggressiveness (especially invasion of the caudal vena

cava). It is unclear whether invasion of the vena cava represented granulomatous invasion of the local vasculature draining into the caudal vena cava, possibly with secondary thrombus formation, or whether thrombus formation was due to focal compression, turbulent blood flow, or a secondary coagulation disorder.
Confusion between hydatid disease and neoplasia appears to be a major challenge in humans, in which hydatid disease may not be spontaneously included in the differential diagnoses in areas where the disease is uncommon [14–15]. In a recent case report, hepatic Echinococcus multilocularis infestation with pulmonary nodules was misdiagnosed as a cholangiocarcinoma with lung metastases in a 38-year-old woman from the Czech Republic living in Germany [16]. The pulmonary nodules were resected and partial hepatectomy was performed. Histopathological examination revealed the presence of parasitic structures, subsequently identified as the larval stage of *Echinococcus multilocularis*.

In the only other reported dog with metastatic pulmonary nodules [7], the presence of the parasite was confirmed at necropsy. In our case, pulmonary nodules, in the absence of necropsy, could not be confirmed as parasitic granulomas. However, the peripheral distribution of those nodules in the pulmonary lung fields in combination with the confirmed hepatic *Echinococcus multilocularis* infestation were highly suggestive of parasitic lung lesions.

Metacestodes protoscolices were observed neither on cytologic samples, neither on biopsies. Concerning cytology, those protoscolices are generally not observed. Only on recent published case reported presence of metacestodes protoscolices [12]. In general, larval membranes are the main cytologic findings [3] [17]

Conclusion
This case highlights the usefulness of cytology and histology in the diagnosis of liver masses. They may permit distinguishing neoplastic process from parasitic cysts.

References:
[1] Moro P., Schantz P. M. (2009). Echinococcosis: a review*. International Journal of Infectious Diseases 13:*125-133.
[2] Peregrine A. S. (2015). Alveolar echinococcosis in dogs: an emerging issue, *Veterinary Record 177:* 567.
[3] Oscos-Snowball A. (2015). What is your diagnosis? Fluid aspirated from an abdominal mass in a dog. *Vet Clin Pathol 44:*167 – 168.
[4] Geisel O, Barutzki D, Minkus G, Hermanns W, Löscher T. (1990). Hunde als Finnenträger (Intermediärwirt) von Echinococcus multilocularis, *Kleintierpraxis 35:*275–280.
[5] Haller M, Deplazes P, Guscetti F, Sardinas JC, Reichler I, Eckert J. (1998). Surgical and chemotherapeutic treatment of alveolar echinococcosis in a dog. *J Am Anim Hosp Assoc 34:*309–314.
[6] Heier A, Geissbühler U, Sennhauser D, Scharf G, Kühn N. (2007). A case of alveolar hydatid disease in a dog: Domestic animals as rare incidental intermediate hosts for Echinococcus multilocularis*, Schweiz Arch Tierheilk 149:*123 – 127.
[7] Gendron K. (2015). Pulmonary Echinococcus multilocularis metastasis in a dog. *Can. Vet. J. 56:*267-271*.*
[8] Peregrine A. S. (2012). Alveolar hydatid disease (Echinococcus multilocularis) in the liver of a Canadian dog in British Columbia, a newly endemic region. *Can Vet J. 53:*870 – 874.
[9] Scharf G. *(2004).* Radiographic, ultrasonographic and computed tomographic appearance of alveolar echinococcosis in dogs. *Veterinary Radiology & Ultrasound*. *45(5)*:411–418.
[10] Caron Y., Losson B.J., Bayrou C. (2017). Cranial abdominal mass due to Echinococcus multilocularis in a two-year-old wirehaired dachshund in Wallonia (Belgium). *Vet Rec Case Rep.*

[11] Pezelet C. (2013). Échinococcose alvéolaire hépatique (Echinococcus multilocularis) chez un chien [hepatic alveolar echynococcosis (Echinococcus multilocularis) in a dog], *Pratique médicale et chirurgicale de l'animal de compagnie* 4:44-48.
[12] Stock G, Pantchev N, Globokar M. What is your diagnosis? Generalized nodular change in a canine liver. Vet Clin Pathol. 8 ed. 2018 May 9; 47(3):511–2.
[13] Antolová D, Víchová B, Jarošová J, Gál V, Bajužík B. Alveolar echinococcosis in a dog; analysis of clinical and histological findings and molecular identification of Echinococcus multilocularis. Acta Parasitol. 2018 Sep 25; 63(3):486–94.
[14] Atanasov G. (2013). Alveolar echinococcosis-spreading disease challenging clinicians: A case report and literature review**.** *World J Gastroenterol, 19(26):*4257–4261.
[15] Bansal N. (2018). A report on three patients with Echinococcus multilocularis: Lessons learned. *Indian Journal of Gastroenterology, May 2018*. P353-358
[16] Pohnan R. (2017). Echinococcosis mimicking liver malignancy: A case report. *International Journal of Surgery Case Reports. 36:*55 – 58.
[17] Oscos-Snowball A, Tan E, Peregrine AS, Foster R, Bronsoiler J, Gottstein B, et al. What is your diagnosis? Fluid aspirated from an abdominal mass in a dog. Vet Clin Pathol. 2014 Oct 28; 44(1):167–8.