What is your diagnosis? Liver from a cow

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Case Presentation

A 10-year-old Aberdeen Angus cow was presented to the Large Animal Medicine Service at Federal University of Santa Maria Veterinary Hospital with a history of weight loss for the past 6 months, watery diarrhea for the last 30 days, tenesmus, and fever. The owner reported the presence of the plant Senecio brasiliensis on pasture and that 10 cattle had died on his property during the past 4 years demonstrating similar ante-mortem clinical signs as the cow that was presented. On physical examination, the cow was dehydrated and mildly febrile (101.7°F) with pale mucous membranes. A moderate mature neutrophilia was noted on the CBC (17,300 cells/μL, RI 4000–12,000). The biochemical serum panel revealed mild hypoalbuminemia (2.79 g/dL, RI 3.30–3.55), moderately decreased AST activity (36 IU/L, RI 78–132), markedly increased GGT activity (39.98 IU/L, RI 6.10–17.40), and moderately decreased urea concentration (35.33 mg/dL, RI 42.80–64.20). A fine-needle aspirate (FNA) smear of the liver was submitted for cytologic evaluation (Figure 1), and a liver biopsy was collected and routinely processed for histopathology.

Figure 1. Fine-needle aspirate of liver from a cow with chronic signs of liver disease. Diff-Quik, ×40 objective.
Cytologic Interpretation: Hepatic megalocytosis

The cytologic sample was of low cellularity and contained hepatocytes arranged individually and in small cohesive clusters. Hepatocytes were round to polygonal with a centrally placed, round to slightly oval nucleus with coarse chromatin and inconspicuous nucleoli. Cytoplasm was moderate to abundant, and intensely eosinophilic with a finely granular bluish appearance. Markedly enlarged hepatocytes (megalocytes) were noted admixed with normal-sized hepatocytes (Figure 1). Anisokariosis was marked with megalocytes presenting larger nuclei (36 µm in diameter) than normal hepatocytes (18 µm in diameter). The background contained abundant blood. A presumptive diagnosis of seneciosis was made based on history, clinical signs, increased serum activity of GGT, hypoalbuminemia, and the presence of megalocytosis on liver cytology.

Liver biopsy evaluation was performed concurrently and confirmed the diagnosis. On histologic examination, there was disruption of hepatic architecture, with abundant connective tissue and fibroblasts replacing cords and lobules. There was biliary hyperplasia, characterized by marked bile duct proliferation, diffuse fibrosis, and numerous megalocytes mainly in periportal areas (Figure 2). The morphologic diagnosis was biliary hyperplasia, fibrosis, and megalocytosis, consistent with pyrrolizidine alkaloid (PA) toxicosis.

Discussion

Seneciosis is caused by the ingestion of Senecio spp. plants, which contain PA. These alkaloids have antimitotic effects on hepatocytes that prevent cell division but not DNA synthesis, resulting in nuclear and cytoplasmic enlargement and formation of megalocytes, the main cytologic and histologic abnormality in PA toxicosis-related chronic bovine liver disease. Several plants in Brazil and other South American countries contain PA, such as Senecio, Echium, and Crotalaria, which is why the diagnosis can have an epidemiologic context. In southern Brazil, the only plant with PA causing enzootic toxicosis is Senecio. An important differential diagnosis is aflatoxicosis; however, this toxicosis is rare in bovine, because they are resistant to aflatoxins. Senecio brasiliensis poisoning is the main cause of death in adult cattle in southern Brazil.

Liver biopsy evaluation is considered the optimal test for diagnosis of seneciosis. Although it is in most cases simple and safe, tissue processing is time-consuming, thus delaying a rapid clinical decision. The cytologic findings of FNA from the liver have not yet been reported for the diagnosis of seneciosis. Here, we show the typical cytologic and histologic findings and suggest that FNA might be a possible method allowing a rapid diagnosis of seneciosis. A larger, well-designed clinical study assessing specificity and sensitivity of FNA cytology is needed.

Key Words: Cattle disease, liver cytology, plant poisoning, seneciosis

References