Obliterative vasculitis caused by ovine herpesvirus type 2 in cattle

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ABSTRACT

Background: Malignant catarrhal fever (MCF) is a frequently fatal viral infection that affects various wild and domestic ruminants and even pigs, as recently reported. It is a disease characterized by lymphoproliferation, vasculitis and erosive-ulcerative lesions in mucosa and skin. In Brazil, the virus that circulates and causes the disease has been identified as OvHV-2. The aim of this study is to describe the clinicopathological changes in a cow with obliterator vasculitis caused by OvHV-2.

Case: A two-year-old Gir cow with a history of intermittent diarrhea and progressive weight loss for approximately a year, which had not improved with antibiotic therapy, was euthanized and subjected to necropsy. In the necropsy, the liver was enlarged, firm, and had a marbled aspect all over the capsular and cut surfaces (light striations intercalated with dark areas). Cut surfaces also revealed thickening of the vessel walls, which exhibited a branched pattern. There was marked thickening of the small and large intestinal walls. The hepatic, mediastinal and mesenteric lymph nodes were enlarged. The samples were fixed in 10% phosphate-buffered formalin, routinely processed for histology, embedded in paraffin, cut 5-µm sections, and stained stained with hematoxylin and eosin. Additionally, sections of the liver and ileum were subjected to Masson’s trichrome staining. The main microscopic alterations were found in the vessels (arteries and veins) of the liver and intestine. Periportal fibrosis and marked pericholangitis which would sometimes form bridges were observed in the liver. Transmural and perivascular fibrosis; the muscular layer was ruptured and there was proliferation of the intima, which caused obliteration of the lumen were also present. The lymph nodes’ medullae exhibited intense infiltration of macrophages and plasma cells with areas of fibrosis, capillary proliferation, and atrophy of medullary cords. Neovascularization and marked inflammatory infiltrates composed of lymphocytes, plasma cells, macrophages and eosinophils were also present. Masson’s trichrome staining revealed areas of fibroplasia. The tissue samples of the carotid rete mirabile, brain and liver were submitted for identification of OvHV-2 by nested polymerase chain reaction (nPCR) tested was positive for ovine herpesvirus type 2.

Discussion: The main histological findings (obliterative vasculitis observed in the small and large intestines, liver, and lymph nodes) plus the detection of viral DNA of OvHV-2 in fragments of the carotid rete mirabile, brain, and liver by nPCR confirmed the diagnosis of malignant catarrhal fever. Chronic cases of MCF in cattle are not often described. The disease is usually manifested in a hyperacute or acute form which culminates with death. The most frequent clinical presentation is the head and eye form, which is characterized by corneal opacity, and ocular, nasal, and oral serous discharge. Bovines with MCF usually exhibit macroscopic and microscopic changes in various organs due to the pansystemic characteristic of the virus, which causes vasculopathy and lymphadenopathy. In this report, the changes were restricted to the intestines, liver, and lymph nodes. The oblitative vasculitis seen in this case is similar to the changes described in cases of chronic. Other herpesviruses which cause lesions to the vascular wall can also cause hyperplasia of the muscular layer with progression to obliterator arteriopathy. This paper reports a presentation of MCR not previously described in Brazil. PCR was an important tool for the conclusion of this case.

Keywords: cattle, ovine herpesvirus 2, pathology, nPCR.
INTRODUCTION

Malignant catarrhal fever (MCF) is a frequently fatal viral infection that affects various wild and domestic ruminants and even pigs, as recently reported [1]. Viruses which cause inapparent infection in their reservoir hosts (wildebeests for alcelaphine herpesvirus 2 - AlHV-1, and sheep for ovine herpesvirus type 2 - OvHV-2) may cause fatal lymphoproliferative diseases when they infect MCF-susceptible hosts [12]. In Brazil, the virus that circulates and causes the disease has been identified as OvHV-2 [3,7]. The aim of this study is to describe the clinicopathological changes in a cow with obliteratorative vasculitis caused by OvHV-2.

CASE

A two-year-old Gir cow with a history of intermittent diarrhea and progressive weight loss for approximately a year, which had not improved with antibiotic therapy, was euthanized and subjected to necropsy. The cattle herd was intercropped with sheep and according to the farmer, no other cases had happened prior to the one reported here. The suspected clinical diagnosis for this case was Johne’s disease; however, the results were negative to the paired tuberculinization test in which avian and bovine tuberculin were used. In the necropsy, the liver was enlarged, firm, and had a marbled aspect all over the capsular and cut surfaces (light striations intercalated with dark areas) [Figure 1]. Cut surfaces also revealed thickening of the vessel walls, which exhibited a branched pattern. There was marked thickening of the small and large intestinal walls (ileum, cecum and colon). Sections of these areas revealed increased consistency. The mucosa was red, swollen and exhibited convolutions. The wall of the ileum measured 1.5 cm in thickness (Figure 2). The hepatic, mediastinal and mesenteric lymph nodes were enlarged. White nodules measuring 2 to 15 mm in diameter were present in the medullar region of some lymph nodes.

Microscopic examination was performed on the brain, cerebellum, liver, spleen, kidneys, heart, small and large intestines, lungs, and lymph nodes. The samples were fixed in 10% phosphate-buffered formalin, routinely processed for histology, embedded in paraffin, cut 5-µm sections, and stained with hematoxylin and eosin (HE). Additionally, sections of the liver and ileum were subjected to Masson’s trichrome staining.

The main microscopic alterations were found in the vessels (arteries and veins) of the liver and intestine (ileum, cecum and colon). Transmural and perivascular fibrosis (Figure 3); the muscular layer was ruptured and there was proliferation of the intima, which caused obliteration of the lumen were also present. Masson’s trichrome staining revealed areas of fibroplasia stained in blue and the alterations of the muscular layer stained in red (Figure 4). Neovascularization and marked inflammatory infiltrates composed of lymphocytes, plasma cells, macrophages and eosinophils were also present. In the ileum, some vessels exhibited transmural vasculitis with hyaline necrosis of the wall. Vessels of the lungs and kidneys exhibited segmental and diffuse thickening of the wall with hypertrophy and hyperplasia of cells of the middle layer as well as moderate perivascular fibrosis.

Periportal fibrosis and marked pericholangitis which would sometimes form bridges were observed in the liver. There was moderate mononuclear inflammatory infiltration in the intestinal mucosa. The lungs exhibited extensive areas of alveolar wall thickening owing to fibrosis, congestion, and the presence of multiple macrophages and lymphocytes. Proliferation of type II pneumocytes were also observed. Lymph nodes exhibited moderate lymphadenitis with depletion of germinal centers. The lymph nodes’ medullae exhibited intense infiltration of macrophages and plasma cells with areas of fibrosis, capillary proliferation, and atrophy of medullary cords.

In formalin fixed samples of the carotid rete mirabile, brain and liver were submitted for identification of OvHV-2 by nPCR. DNA isolation was carried out using a standard protocol with proteinase K/phenol/chloroform extraction and ethanol precipitation [13]. The nPCR reaction protocol and primers were performed as previously described [7], and all samples analyzed were positive for OvHV-2. The main histological findings (obliteratorative vasculitis observed in the small and large intestines, liver, and lymph nodes) plus the detection of viral DNA of OvHV-2 in fragments of the carotid rete mirabile, encephalon, and liver by nPCR confirmed the diagnosis of malignant catarrhal fever.
DISCUSSION

Chronic cases of MCF in cattle are not often described [8,9]. The disease is usually manifested in a hyperacute or acute form which culminates with death. The most frequent clinical presentation is the head and eye form, which is characterized by corneal opacity, and ocular, nasal, and oral serous discharge [3,7,10]. However, distinct or overlapping digestive, neurological, and cutaneous manifestations can also occur [3,10,12]. Apparently, all affected animals initially show ocular changes; however, in the case reported here, such changes did not occur or were not reported by the owner. Bovines with MCF usually exhibit macroscopic and microscopic changes in various organs due to the pansystemic characteristic of the virus, which causes vasculopathy and lymphadenopathy [8]. In this report, the changes were restricted to the intestines, liver, and lymph nodes. The obliterative vasculitis seen in this case is similar to the changes described in cases of chronic MCF [8,9,14]. Other herpesviruses which cause lesions to the vascular wall can also cause hyperplasia of the muscular layer with progression to obliterative arteriopathy [2,5].

Johne’s disease should be included in the differential diagnosis of MCF owing to the clinical and macroscopic changes of the intestine. Animals with chronic fasciolosis can exhibit liver alterations such as thickening and dilation of bile ducts [11], which
could be similar to what was seen in the case presented here; however, this case showed vascular alterations on histological examination. Poisoning by Senecio spp. and Crotalaria retusa should also be included in the differential diagnosis of MCF due to the hepatic fibrosis; however, poisoning by these plants do not cause vascular alterations [4,6]. Vasculitis of the carotid rete mirabile, which is considered to be an important finding for the characterization of the disease in both acute and chronic cases [8-10], was not observed in this case. This paper reports a presentation of MCR not previously described in Brazil. PCR was an important tool for the conclusion of this case.

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REFERENCES


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