

## Emphysematous eosinophilic lymphangitis in the bovine rumen

Inflammation of lymphatic vessels (lymphangitis) is usually caused by a variety of bacterial or parasitic infections. Disorders characterized by emphysematous dilation of lymphatic vessels (lymphangiectasis) associated with inflammatory process are uncommon. A typical example of such rare lymphatic vessel conditions is a bowel disease referred to as pneumatosis cystoides intestinalis in man and some animal species, where several theories are proposed on the causes but none of them have sufficiently explained so far the entire pathologic process. A pathologically-relevant disorder encountered recently in cattle (*Bos taurus*) was investigated by histologic and bacteriologic methods.

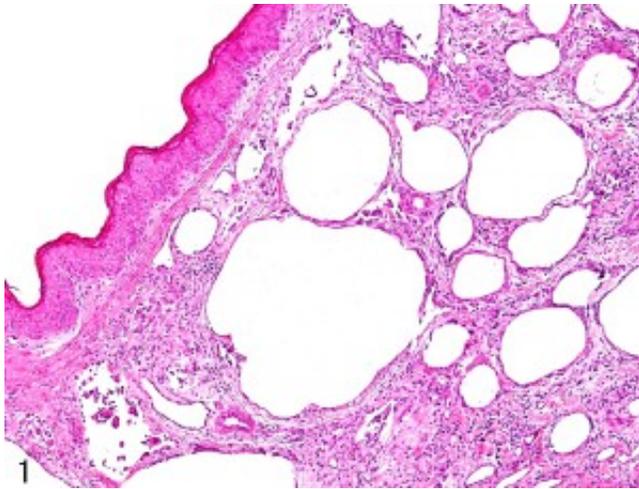


Fig. 1. Ruminal submucosa exhibits multicystic emphysematous dilation of lymphatic vessels, some of which contain infiltrating cells. Hematoxylin and eosin (HE) stain.

A group of cattle that were raised on different farms and slaughtered for food on separate days showed focal areas of numerous, minute, gas bubbles within the walls of the rumen?the first part of the forestomach. Molecular and chemical investigations to analyze gaseous constituents were unavailable and routine bacterial cultures of rumen walls yielded no significant bacterial growth. On microscopic observation, these gas bubble lesions proved to be comprised of multicystic emphysematous lymphangiectasis in the submucosa of the rumen (Fig. 1) and remarkably dilated lumens of these lymphatic vessels were infiltrated by varying numbers of eosinophilic leukocytes and granulomas comprising macrophages and multinucleated giant cells of foreign body type. Macrophages and giant cells phagocytosed eosinophilic leukocytes which showed nuclear pyknosis or fragmentation (Fig. 2). These eosinophilic leukocytes stained positively with TUNEL (TdT-mediated dUTP nick end labeling) assay which is a method for detecting DNA fragmentation

that results from apoptotic signaling cascades (Fig. 2, inset). Submucosal tissues surrounding areas of lymphangiectasis exhibited prominent inflammatory cellular infiltrates, including eosinophilic leukocytes, mast cells, macrophages, lymphocytes, and plasma cells. To a varying degree, edema, hemorrhage, fibrin deposition, capillary proliferation, and collagen fiber deposition were seen as well, indicating an increased vascular permeability. Globule leukocytes which are probably counterparts of mast cells infiltrated the ruminal epithelia of many cattle. Bacteria, parasites, or fungi were not demonstrated elsewhere in the ruminal submucosa.

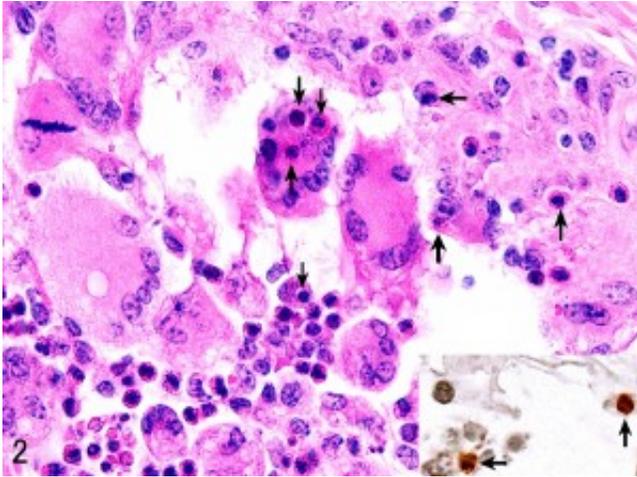


Fig. 2. Many eosinophilic leukocytes, macrophages, and giant cells infiltrate into dilated lumen of a lymphatic vessel. Some eosinophilic leukocytes (arrows) are phagocytosed by giant cells or macrophages. HE stain. The inset shows TUNEL-positive eosinophilic leukocytes (arrows) which are phagocytosed by giant cell and macrophage. TUNEL stain.

Based on its characteristic microscopic features, the lymphatic vessel disorder observed in these cattle was diagnosed as emphysematous eosinophilic lymphangitis. It was not possible to determine the portal of entry for gas leading to the development of lymphangiectasis. Although speculative, gaseous components stagnated within dilated lymphatic vessels over a long period might have served as noxious substances. Ruminal submucosa presented with a wide variety of changes suggestive of an implication of hypersensitivity reactions, including (1) significant infiltration of eosinophilic leukocytes, mast cells, lymphocytes, and plasma cells, (2) evidence of an increased vascular permeability, (3) appearance of globule leukocytes, (4) formation of granulomas composed of macrophages and giant cells, and (5) phenomenon of phagocytosis of TUNEL-positive eosinophilic leukocytes by macrophages and giant cells. Eosinophilic leukocytes and mast cells usually coexist in the late and chronic phases of allergy and play a role as the key effector cells there. Furthermore, phagocytic removal of apoptotic eosinophilic leukocytes by macrophages and giant cells, may be an important event which promote the resolution and repair process of allergic inflammation, as seen in asthma, allergic rhinitis/sinusitis, and sinonasal polyps.

Final determination of precise etiology and pathogenesis of the lesions are difficult at present, although an immune-mediated mechanism involving lymphatic vessels may be one of the likeliest possibilities.

**S. Ohfuji**

*Department of Histopathology, Diagnostic Animal Pathology Office  
Hokkaido, Japan*

## **Publication**

[Emphysematous eosinophilic lymphangitis in the ruminal submucosa of cattle.](#)

Ohfuji S.

*Veterinary Pathology 2015 Nov*