BRIEF NOTE

An Ovine Case of Generalized Aspergillosis with Alimentary Lesions

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Many papers have been published to report pulmonary aspergillosis in sheep [2, 5, 21, 24]. Regarding generalized aspergillosis Gracey and Baxter [11] reported a single case in which primary pulmonary lesions extended to the mediastinal lymph node, myocardium and kidney. No reports however, have been made on alimentaryaspergillosis in sheep, so far as the authors know, while alimentary cases have been reported in cattle [1, 7, 9, 10, 12, 16], colts [14], horses [13] and cats [3, 8, 19, 23]. The present report might be the first on alimentary aspergillosis in sheep.

Clinical history: A three-year-old Suffolk ram, mainly fed hay, began to be fed cornsilage on February 1, 1979. Anorexia and pyrexia suddenly appeared 15 days later. After treatment with 5 mg of dexamethasone, 5 ml of mycilline and 200 ml of 20% glucose they disappeared and the ram was again fed cornsilage. His condition was aggravated and anorexia seen 15 days later. Ruminal and intestinal movements were suspended and constipation was seen. Body temperature was 38.4°C, pulse rate 116, and respiratory rate 30. Systemic icterus occurred on the 16th day. Anemia and hemoglobinuria were detected on the 17th day. The red blood cell count decreased from 1,116×10⁴/mm³ on the 16th day to 481×10⁴/mm³ on the 21st day, while the white blood cell count increased from 12,500/mm³ to 27,900/mm³ and the thrombocyte count from 546×10³/mm³ to 952×10³/mm³. The segmented neutrophil comprised 78–87% of the entire white blood cells. The results of serum analysis on the 16th day were as follows: S-GOT, 5,040 K-U; LDH, 21,700 W-U; γ-GTP, 313 mU/ml, and amylase, 395 U/dl. They indicated a disturbance in the liver function. Death occurred on the 21st day. During the terminal 7 days, body temperature varied from 39 to 41°C and anorexia continued. Then 20 mg of dexamethasone (5 mg daily for 4 days) and 10 ml of mycilline by I.M. and 3 g of 2-mercaptopropionyl glycine by I.V. were administered totally.

Autopsy: Soybean-sized hemorrhagic necrotic lesions were seen scattered. They were reddish black or grayish yellow in color and protruded from the mucosal surface of the ventral sac of the rumen. Similar lesions
were observed all over the reticulum. Grayish white erosive lesions were noticed all over the mucosal surface of the omasum, and soybean-sized perforative ulcers seen on the leaves. The ulcers had grayish yellow peripheral zones. Scarring ulcers were found on the mucosa of the ostium omaso-abomasicum. Reddish black ulcers ranging from rice-grain to soybean in size were scattered over the mucosa of the abomasum. Many sesame-grain-sized petechiae were observed on the mucosa of the abomasum. Ulcers were also found on the mucosa of the cecum. Their surface was coarse and solid, and their marginal zone thickened. Small pale reddish-purple plaques finger-tip or thumb-tip in size were observed on the serosa of the colon. Rather large ulcers covered with a pseudomembrane were seen additionally on the mucosa of the colon. These ulcers were slightly ridged, depressed in the central zones and eroded to the muscular layer. Sesame-grain-sized grayish white nodules with dark red cuffs were seen scattered all over the lung, and presented as small protrusions on the pleural and cut surface. The heart was markedly round in shape. A soybean-sized discolored lesion covered with fibrin was found on the epicardium.

Besides, generalized icterus, centrolobular fatty degeneration of the liver, hemorrhagic infarct in the spleen and diffuse fat necrosis in the peripancreatic adipose tissue were observed.

Histological findings: In the mucosa of the forestomachs, necrotic and hemorrhagic foci and ulcers were seen (Fig. 1). They were accompanied with necrotic and purulent submucosal lesions showing a slight proliferation of histiocytic cells. In the lesions, hyphae were scattered and penetrated into degenerative blood vessels (Fig. 2). Occasionally, those lesions extended to the muscular layer. Micro-necrosis or vacuolation was observed in the mucosal epithelial layer, most frequently in the omasum. The submucosal mycotic lesions caused coagulated necrosis of the mucosal ulcers in the abomasum, cecum, colon and rectum, as in the forestomachs (Fig. 3). The ulcers extended to the lamina muscularis mucosae where numerous proliferative hyphae were observed (Fig. 4). Solitary lymph nodules located in the lesions were often substituted by neutrophils.

In the lung, nodular lesions contained alveoli and bronchioles which were filled with neutrophils, cell debris, and occasionally hyphae scattered (Fig. 6). In the heart, small foci of fresh myocardial necrosis were seen sporadically. In them neutrophils and histiocytes reacted, and hyphae were seen scattered (Fig. 7).

When stained by PAS and PAM, hyphae had septa, peculiar intracellular substances and Y-shaped branches (Fig. 5). They were considered to be those of *Aspergillus* sp. according to their characteristic morphology.

The liver showed centrolobular fatty degeneration, deposition of bile pigment, and bile thrombosis in the canaliculi, but contained no hyphae.

In addition, follicles were atrophic in the lymph nodes all over the body.

Mycologically, *Aspergillus fumigatus* was isolated from lesions in the reticulum.

Literature review on generalized aspergillosis of cattle revealed that Cousin et al. [7] referred to lesions in the small intestine, liver and lung, Hatzios [12] to lesions in the abomasum, liver, lung and cerebrum, and Gortsevskii [10] to lesions in the intestine, omasum and liver. They [7, 10, 12] described lesions in the alimentary tract and dissemination of *Aspergillus* to the liver. Gortsevskii [10] stated that hyphae invaded the gastrointestinal mucosa, proliferated in
the loose connective tissues, and were disseminated by the blood stream. In the present case, alimentary and pulmonary lesions could be considered as a primary, and myocardial lesions as a secondary infection from the lung.

In their report on phycomycosis and aspergillosis of the calf, Cordes and Shortridge [6] described many cases of alimentary phycomycosis, but recognized no alimentary aspergillosis. Neitzke and Schiefer [17] also referred to phycomycotic ruminitis, but noted no aspergillosis in the calf. Smith [22] made a literature review on mycosis of the alimentary tract of animals, and reported that the involvement of the gastrointestinal tract as the initial site of infection with various Aspergillus sp. was extremely rare. In sheep, mucormycosis in the alimentary tract was reported [4, 15, 18, 20], but aspergillosis in this tract has not been reported. Thus, aspergillosis in the alimentary tract is presumed to be rare in ruminants, as compared with mucormycosis.

In the present case, sudden changes in food, disturbances in the liver function, and administration with dexamethasone and mycilline might provide a chance of infection with Aspergillus fumigatus.

References
要約

綿羊における消化器系病変を伴った全身性アスペルギルス菌症の1例（短報）：千早 豊・松川 清・高橋清志・松井幸夫・高坂雅孝・斎藤直司・水島俊一（酪農学園大学家畜病理学教室・家畜内科学教室・酪農微生物学教室）—乾草からコーン・サイレージへの飼料の切り換えの後、高熱、胃腸障害および肝機能障害を示し、デキサメサゾン、マイシンで治療されていた。5歳、雄、サフォーク種綿羊にみられた全身性アスペルギルス菌症の1例を報告した。菌糸を伴う病巣は、前胃、第四胃、大腸、肺および心筋に認められた。綿羊において、全身性アスペルギルス菌症の報告は少なく、かつ、消化器系アスペルギルス菌症の報告は、本例が最初と思われた。

Explanation of Figures

Fig. 1. Focal necrosis of the mucosa with marked neutrophil infiltration and cell debris in the oasum. Neutrophils accumulate in the submucosa and infiltrate diffusely to the muscular layer. H-E staining. ×38.

Fig. 2. Myotic thrombus in the submucosa of the rumen. Hyphae with septa are invading the vascular wall and thrombus. Perivascular neutrophil infiltration is observed. PAS and H-E staining. ×380.

Fig. 3. Diffuse necrosis with marked hemorrhage and neutrophil infiltration from the mucosa to the superficial muscular layer in the large intestine. H-E staining. ×38.

Fig. 4. Hyphae in the lamina muscularis mucosae of the large intestine. They are proliferating along the muscularis mucosae. PAS and H-E staining. ×380.

Fig. 5. Markedly septate Y-shaped hyphae in the submucosa of the large intestine. They proliferate vertically to the muscular layer. PAS and H-E staining. ×380.

Fig. 6. Intraalveolar hyphae and marked neutrophil infiltration. Hyphae have intracytoplasmic substance and septum. PAS and H-E staining. ×380.

Fig. 7. Hyphae in the myocardium. Degenerative muscular fibers and interstitial cellular reaction are observed. PAS and H-E staining. ×380.