

Pathology of mycotic rumenitis and reticulitis in sheep - A case report

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ABSTRACT

The current case report describes the pathology of mycotic rumenitis and reticulitis in sheep. A carcass of female adult sheep with a history of abortion (a few weeks before) was presented for necropsy at the post-mortem facility, Division of Pathology, IVRI. Post-mortem examination revealed focal to widespread, irregular, hemorrhagic, necrotic and transmural lesions on serosal and mucosal surfaces in the rumen and reticulum. The mucosal surface of the reticulum showed erosive, ulcerative and necrotic lesions with loss of honeycomb structure and characterized by whitish necrotic deposits. The reticulum at one side was firmly adhered to the diaphragm. The heart showed gelatinized epicardial fat. Histopathological examination of tissue samples showed the presence of numerous fungal hyphae in homogenous eosinophilic necrotic mucosa and infiltration of mononuclear cells in the submucosa and muscularis of the reticulum. The swabs from lesions of rumen and reticulum were found negative for *Fusobacterium* spp. and *Clostridium* spp. Further, PAS staining revealed the presence of magenta-colored numerous branching and septate hyphae and free chlamydozoospores in the reticulum.

Keywords: Fungal hyphae, PAS, Reticulitis, Rumenitis

Mycotic rumenitis and reticulitis in sheep, commonly referred to as fungal infections of the forestomach, represent a significant health concern in small ruminants. These conditions are primarily caused by fungal species such as *Aspergillus* spp., *Candida* spp., and *Mucor* spp., which opportunistically invade the rumen and reticulum, leading to inflammation and tissue damage^{1,2}. Mycotic rumenitis can be caused by initial ruminal acidosis, excess grain consumption and traumatic or chemically induced mucosal injury and this significant mucosal injury allows invasion and proliferation of fungi³. The pathology of mycotic rumenitis and reticulitis typically involves fungal colonization of the mucosa, which triggers an inflammatory response characterized by edema, hyperemia, and necrosis of the affected tissues⁴. Fungi can penetrate the epithelial layer, leading to ulceration and subsequent abscess formation within the rumen and reticulum. Clinically, affected sheep may present with signs of anorexia, weight loss, depression, rumen atony, abdominal discomfort, profuse diarrhoea, foul-smelling feces and decreased milk production⁵. Acidosis causes elevated cardiac and respiratory rates. A change in osmotic pressure will cause fluid to migrate from the circulation into the rumen, resulting in hypovolemia. Diagnosis often involves a combination of clinical signs, histopathology, Immunohistochemistry, immunofluorescence, enzyme immunoassay and microbiological culture of rumen contents or tissue samples². Management strategies include antifungal therapy, supportive care to alleviate clinical signs and improvement of environmental conditions to minimize fungal exposure^{4,5}. The prognosis varies according to the severity of the illness and the timing of intervention. This case describes the pathology of mycotic rumenitis and reticulitis in sheep.

A carcass of female adult sheep with a history of abortion (a few

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weeks before) was presented for necropsy at the post-mortem facility, Division of Pathology, IVRI. The physical examination of the carcass revealed pale conjunctival mucous membranes, rigor mortis in hind limbs, rough hair coat and maggot wound with soiled wool at the perineal region. The carcass was opened systematically and all the internal organs and cavities were examined for the presence of gross lesions. The representative samples from the rumen and reticulum showing gross lesions, were collected and fixed in 10%

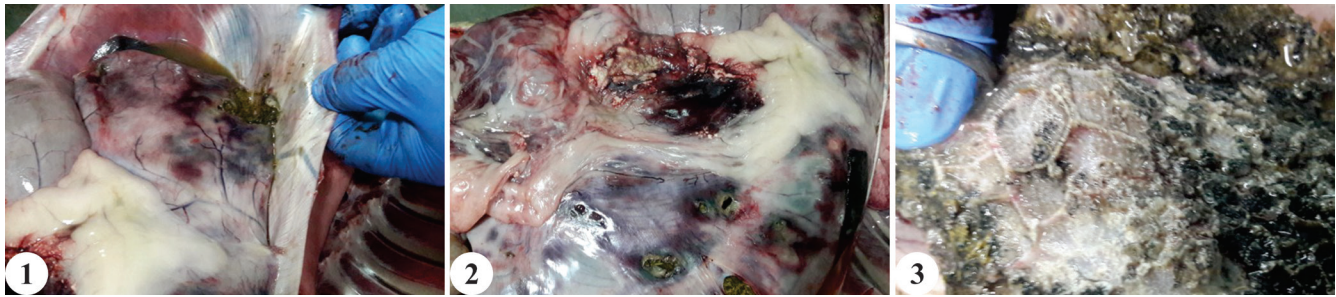


Fig. 1. Reticulum showing focal hemorrhagic and necrotic lesions on the serosal surface with a portion of reticulum firmly adhered to the diaphragm; **Fig. 2.** Rumen showing transmural rumenitis and numerous focal to diffuse irregular hemorrhagic, necrotic lesions on the serosal surface; **Fig. 3.** Reticulum showing erosive, ulcerative, necro-suppurative lesions with loss of honeycomb structure, characterized by whitish necrotic deposits.

neutral buffered formalin for histopathological studies and processed routinely and stained with hematoxylin and eosin⁶. Tissue sections were also processed for PAS staining^{7,8}. The swabs from lesions of rumen and reticulum were collected in a sterile container for bacteriological examination.

On gross pathological examination, the reticulum on one side was firmly adhered to the diaphragm (Fig. 1). Numerous focal to widespread, irregular, hemorrhagic, necrotic and transmural lesions were present on the serosal and mucosal surfaces of the rumen and reticulum, similar to the case described by the previous author⁹ (Fig. 2). The lesions on the mucosal surface of the reticulum included erosive, ulcerative, and necrotic lesions with

loss of honeycomb structure and characterized by whitish necrotic deposits, which were comparable to previous studies¹⁰ (Fig. 3). Histopathological examination revealed the marked infiltration of mononuclear cells (MNC) in the submucosa and tunica muscularis of the reticulum (Figs. 4-5) and the presence of numerous fungal hyphae in homogenous eosinophilic necrotic mucosa and infiltration of mononuclear cells in the submucosa and muscularis of the reticulum and is in accordance with the previous reports¹¹⁻¹³ (Fig. 6). The bacteriological culture examination found negative for *Fusobacterium* spp. and *Clostridium* spp. Further, PAS staining revealed the presence of magenta-colored numerous branching and septate hyphae and free chlamydospores in the reticulum

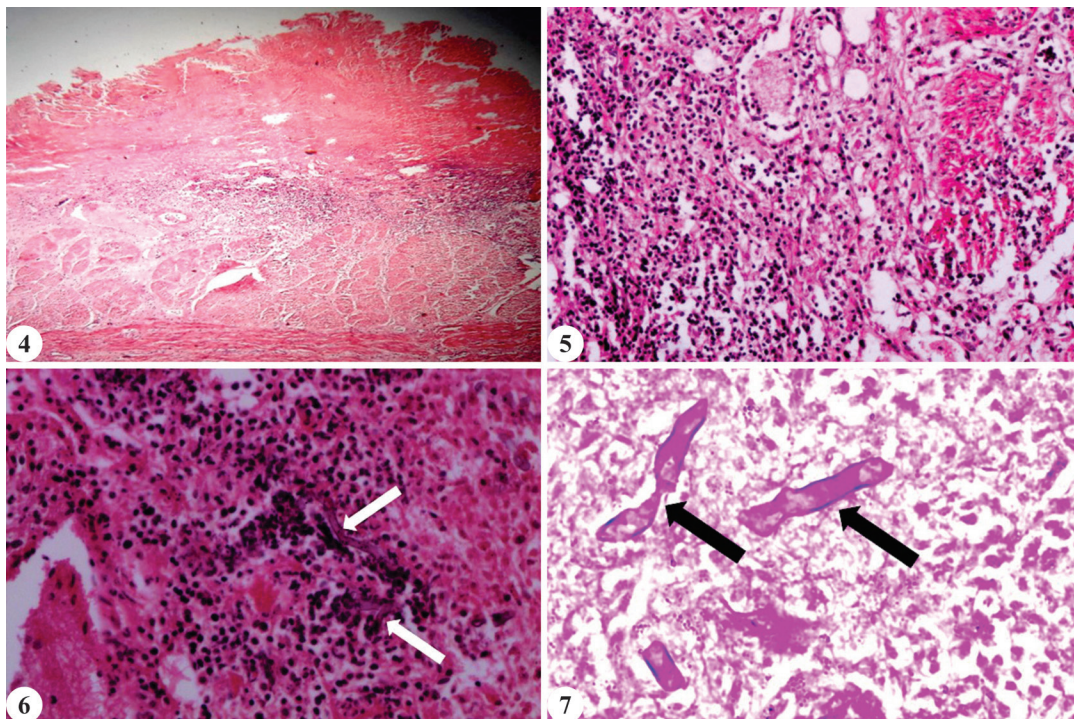


Fig. 4. Reticulum showing necrosis of mucosa, marked infiltration of MNC in submucosa and muscularis (H&E x40); **Fig. 5.** Reticulum showing marked MNC infiltration in submucosa and tunica muscularis (H&E x200); **Fig. 6.** Reticulum showing fungal hyphae (arrow) surrounded by MNC infiltration in submucosa and lamina propria (H&E x200); **Fig. 7.** Reticulum showing magenta-colored fungal hyphae (arrow) (PAS x400).

(Fig. 7).

This report briefly detailed the gross and microscopic lesions associated with mycotic rumenitis and reticulitis in sheep. This case was diagnosed as mycotic rumenitis and reticulitis due to the presence of fungal hyphae in the ruminal and reticulum tissue, as well as distinctive gross necrotic lesions.

REFERENCES

1. Smith BP. 2020. *Large Animal Internal Medicine* (6th ed.). Elsevier.
2. Jones TC, Hunt RD and King NW. 2018. *Vet Pathol* (7th ed.). Wiley-Blackwell.
3. Njaa BL, Panciera RJ, Clark EG and Lamm CG. 2012. Gross lesions of alimentary disease in adult cattle. *Vet Clin North Am Food Anim Pract* **28**: 483-513.
4. Brown C. 2019. *Clin Pathol Farm Anim* (4th ed.). Wiley-Blackwell.
5. Roberts SJ and Ellis A. 2017. *Manual Sheep Dis* (2nd ed.). Wiley-Blackwell.
6. Luna LG. 1968. *Manual of histologic staining methods of the Armed Forces Institute of Pathology*. New York, USA: McGraw Hill.
7. McManus JFA. 1961. General cytochemical methods. *JF Danielli Ed 2*: p.171.
8. Frickmann H, Loderstaedt U, Racz P, Tenner-Racz K, Eggert P, Haeupler A, Bialek R and Hagen RM. 2015. Detection of tropical fungi in formalin-fixed, paraffin-embedded tissue: still an indication for microscopy in times of sequence-based diagnosis. *Biomed Res Int* 938-721.
9. Headley SA, Müller MC, de Oliveira TES, Duarte CABG, Pereira PFV, Vieira MV, Cunha CW, Flores EF, Lisbôa JAN and Pretto-Giordano LG. 2020. Diphtheric aspergillosis tracheitis with gastrointestinal dissemination secondary to viral infections in a dairy calf. *Microb Pathol* **149**: 104-497.
10. Jensen HE, Olsena SN and Aalbæk B. 1994. Gastrointestinal aspergillosis and zygomycosis of cattle. *Vet Pathol* **31**: 28-36.
11. Ates MB, Ortatatli M, Hatipoglu F, Ciftci MK, Ozdemir O and Terzi F. 2016. Mycotic gastritis and enteric cryptosporidiosis in a Holstein calf. Second international conference on science, ecology and technology.
12. Dyer NW and Newell TK. 2002. Mycotic rumenitis in American bison (*Bison bison*). *J Vet Diagn Invest* **14**: 414-416.
13. Chihayak Y, Matsukawa K, Mizushima S and Matsui Y. 1988. Ruminant forestomach and abomasalmucormycosis under rumen acidosis. *Vet Pathol* **251**: 119-123.