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Pulmonary hemangiosarcoma in a ram: A rare case report

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Abstract
Hemangiosarcoma (HSA) is a malignant neoplasm originating from vascular endothelial cells and is known for its aggressive behavior, high metastatic potential, and hemorrhagic characteristics. Though well-documented in dogs, its incidence in small ruminants like sheep is exceptionally rare. This case report describes a primary pulmonary hemangiosarcoma in a 5-year-old breeding ram that succumbed to sudden death following a brief clinical history of respiratory distress. Postmortem examination revealed non-collapsing, hemorrhagic lungs with thoracic effusion and a cystic lesion. Impression smear revealed spindled shaped anisocytic neoplastic cells with pleomorphic round to oval nucleus with prominent nucleoli. Histopathological evaluation confirmed neoplastic endothelial proliferation forming irregular vascular channels with hemorrhage. Based on gross, cytology and histopathological examination present case diagnosed as pulmonary hemangiosarcoma.

Keywords: Pulmonary hemangiosarcoma, Histopathology, Ram, Vascular tumor

Introduction
Hemangiosarcoma (HSA) is a highly aggressive, malignant tumor of endothelial origin, typically observed in dogs, and less commonly in other domestic species. Characterized by rapid proliferation, extensive hemorrhage, and metastasis, HSA often remains undetected until advanced stages or death. Pulmonary hemangiosarcoma, whether primary or metastatic, is very rare in sheep and often diagnosed only at postmortem (Maxie, 2023; Head *et al*., 2020) [1, 2].
In ruminants, pulmonary neoplasms are infrequent, and primary vascular tumors like HSA are even more unusual and reported less than 1% total neoplasm cases. Most cases were reported in adult ruminant animals aged over 5-6 years. Cases are typically mistaken for infectious diseases due to overlapping respiratory symptoms. Histopathologically, the tumor is composed of pleomorphic endothelial cells lining irregular vascular spaces filled with blood, often associated with necrosis, thrombosis, and hemosiderophages (Ozmen, 2018; Singh & Saxena, 2020) [3, 5]. The high mitotic index, marked anisocytosis, and tissue infiltration are features of its malignant potential. Reports of hemangiosarcoma in sheep remain limited to isolated cases (Naghshineh *et al*., 2022; Modesto *et al*., 2016) [4, 7], but its occurrence can have profound implications, especially when it affects genetically valuable animals used for breeding. This case presents a rare incidence of pulmonary hemangiosarcoma in anadult ram, with detailed clinical, gross, cytological and histopathological findings supporting the diagnosis.

Case Presentation and Discussion
A 5-year-old breeding ram from a semi-intensive flock of 150 sheep was brought for postmortem examination to the Department of Veterinary Pathology, College of Veterinary Science, Proddatur, following sudden death. The owner reported a five-day history of progressive illness with clinical signs including severe dyspnea and serous blood-tinged nasal discharge. The ram was maintained for crossing ewes due to its superior genetic merit. No similar symptoms were noted in other animals of same flock.

Gross Findings
The ram's carcass was in good condition, and rigor mortis was complete.

External examination revealed no abrasions or mucosal hemorrhages. On thoracic cavity opening, 50-100 ml of straw-coloured serous fluid was observed. The lungs were enlarged, failed to collapse, and had rounded margins. Multifocal to coalescing dark red to black hemorrhagic patches were distributed over the pulmonary surfaces (Fig 1). Cut sections of the trachea, bronchi, and bronchioles exuded frothy blood-tinged fluid (Figure 2). A 2-4 cm fluid-filled cyst was located in the left diaphragmatic lobe. The mediastinal lymph nodes appeared normal, while other visceral organs showed mild to moderate congestion.

These findings suggest a vascular neoplastic condition affecting the lungs, which aligns with earlier reports of pulmonary HSA.

Fig 1: The lungs showing multifocal to coalescing, dark red to black hemorrhagic echymosis distributed diffusely over the lung surfaces

Fig 2: Cut section of the lung parenchyma showing dark red to black hemorrhagic echymosis with oozing of dark coloured blood

Cytological findings

Impression smears from the lungs revealed a moderately to highly cellular smear with a hemorrhagic background rich in erythrocytes, hemosiderin-laden macrophages. The smears contained numerous spindle to stellate pleomorphic neoplastic cells dispersed singly and in loose aggregates, forming primitive vascular clefts and channels characteristic of endothelial origin (Figure 3). The cells displayed moderate, basophilic cytoplasm with indistinct borders, clear cytoplasmic vacuoles, consistent with early lumen formation. Nuclei were large, pleomorphic, and hyperchromatic, containing coarsely stippled chromatin and one to three prominent nucleoli. Marked anisocytosis and anisokaryosis along with atypical and bizarre mitotic figures, reflecting high mitotic activity and cellular atypical (Mullin C, 2019) [8]. These cytomorphological findings are consistent with a high-grade vascular neoplasm, confirming the cytological diagnosis of hemangiosarcoma (Cowell *et al*., 2020) [6].

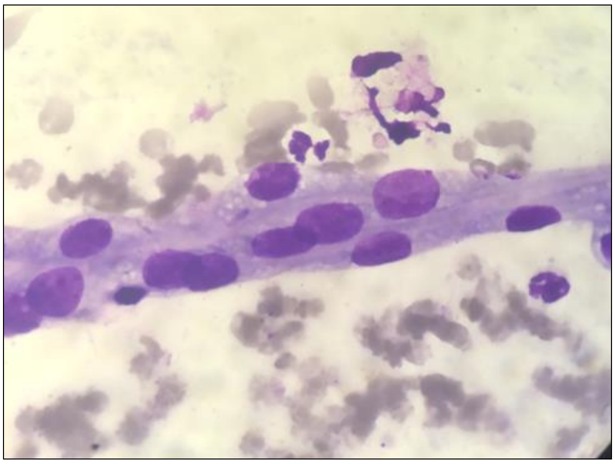

Fig 3: The smear from lung contained numerous spindle to stellate pleomorphic neoplastic cells dispersed singly and in loose aggregates, forming primitive vascular clefts and channels characteristic of endothelial origin. Leishman: 100X

Histopathological findings

Tissues from lungs, liver, spleen, and lymph nodes were fixed in 10% buffered formalin, embedded in paraffin, sectioned at 4 µm, and stained with hematoxylin and eosin (H&E). Microscopic examination of lung tissue revealed, proliferation of numerous spindloid to elongated endothelial cells, forming irregular blood-filled vascular clefts/channels (Figure 3). Mild bronchiolar ectasis was evident with hypertrophy and hyperplasia of the bronchiolar epithelium. Stroma filled with hemorrhage, proliferating neoplastic endothelial cells, and few marcophages laiden with hemosiderin pigment. Neoplastic endothelial cell are pleomorphic hyperchromatic nuclei, 1-3 prominent nucleoli, with mitotic figures. Anisocytosis and anisokaryosis were prominent.

These histological features are consistent with previous reports of HSA in ruminants (Naghshineh *et al*., 2022; Ozmen, 2018) [4, 3], characterized by vascular channels, cavernous blood lakes, and neoplastic endothelial lining. The tumor's aggressive behavior and systemic spread are hallmarks of high-grade HSA (Head *et al*., 2020; Maxie, 2023) [2, 1].

Given the sudden onset of symptoms and acute demise, the cause of death is most likely due to pulmonary failure from hemorrhage and vascular compromise. The presence of a thoracic effusion, diffuse hemorrhagic lung involvement, and vascular neoplasia firmly support the diagnosis of pulmonary hemangiosarcoma.

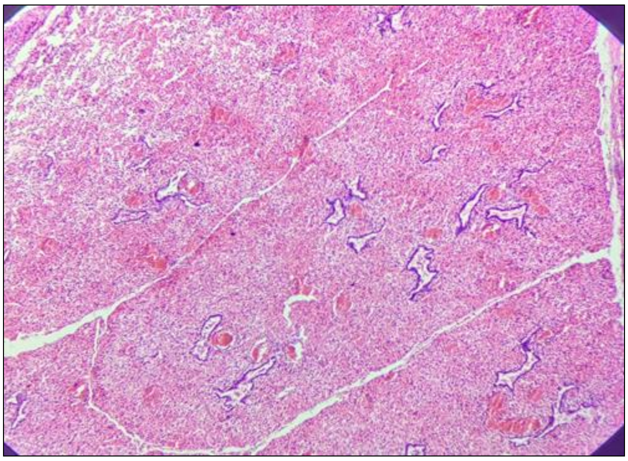

Fig 4: Section of the lung showing numerous neoplastic proliferations of endothelial cells forming irregular, anastomosing blood-filled vascular channels. Note bronchiolar dilatation with hypertrophy and hyperplasia of bronchiolar epithelium with oedema in the lumen of the bronchi. H&E: 4X

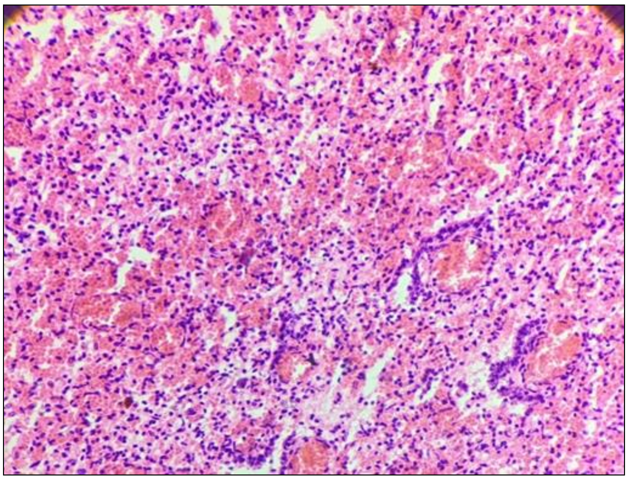

Fig 5: Microscopic section of the lung showing numerous varying sized vascular channels filled with erythrocytes. Note few erythrocytes, and macrophages in the parenchyma of the lung. H&E: 40X

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Conclusion
This case documents a rare occurrence of primary pulmonary hemangiosarcoma in a ram, confirmed by gross, cytological and histopathological analysis. The case underscores the importance of including vascular tumors like HSA in the differential diagnosis of sudden death and respiratory distress in small ruminants. Timely necropsy and tissue evaluation are essential, especially in genetically valuable animals, to avoid misdiagnosis and to understand the epidemiological presence of these kind of tumors in field conditions.

Conflict of Interest
The authors declare no conflict of interest related to the content of this manuscript.

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