

A rare case of pulmonary adenocarcinoma in Pattanam sheep

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Received: 27.3.26; Accepted: 5.5.26

ABSTRACT

A two-year-old female Pattanam sheep was submitted for necropsy to the Department of Veterinary pathology, Veterinary College and Research institute, Orathanadu. During necropsy, the gross lesions were observed and required tissue samples were collected for histopathology. Grossly, tracheal and bronchial lumen contained frothy exudate. Lungs were adhered to the pleura and showed dark red firm consolidated areas with grey or pale nodular areas. Histopathologically, lungs revealed multifocal adenomatous appearance of the parenchyma. Alveolar wall transformed into cuboidal epithelium as well as columnar epithelium which formed acinar and papillary pattern. Based on the gross lesions and histopathology, a very rare case of pulmonary adenocarcinoma in a Pattanam sheep is documented.

Keywords: Pulmonary adenocarcinoma, Pattanam Sheep

Respiratory infections are quite common and responsible for 30-40% of mortality in sheep of various ages¹. Ovine pulmonary adenocarcinoma (OPA) is a contagious respiratory tumour of small ruminants, characterized by chronic weight loss and respiratory failure. Infection with the beta retrovirus Jaagsiekte sheep retrovirus (JSRV) is the cause of OPA². The disease primarily affects both domestic and wild sheep, and does not occur in other livestock except goats, in which, the disease has been described in subclinical form. OPA was first described as a cause of respiratory distress in sheep in South Africa in 1865. In that time, the disease was called “jaagsiekte”, the name that is derived from the Afrikaans and means “chasing sickness”. This is because affected animals show difficulty to breathe as if they are being chased. Since then, OPA has distributed worldwide except in Australia, New Zealand and Iceland which have eradicated the disease³. Two- to four-year-old sheep are primarily affected⁴. It has been identified in a wide variety of breeds in many countries around the world including India. It is responsible for severe economic losses to the sheep industry in many sheep rearing countries and the subclinical form of the disease affects growth rate, carcass weight, and milk and wool production.

OPA is believed to be the most important disease that can affect international trade as determined by the Office International des Epizooties (OIE). In addition to its importance as a Veterinary study on cancer, it has similar pathological and epidemiological features to bronchoalveolar carcinoma in humans, and is considered a useful animal model of pulmonary carcinogenesis¹. Neoplastic proliferation of type II pneumocytes and Clara cells, produce papillary to acinar tumoral pattern with infiltration of macrophages, lymphocytes and plasma cells⁵. The gross findings of naturally occurring OPA are heterogeneous, exhibiting variations in anatomical patterns or forms: classical, atypical and mixed. Classical forms exhibit extensive, consolidated, grey areas, primarily located in the cranioventral lung regions, and appear moist on section. Atypical forms are characterized by white, well-demarcated nodules that are dry at the cut surface. A wide variety of mixed forms may be observed in the same affected flock, and even nodules resembling atypical lesions have been noted in the same lung in which the classical lesion is present⁴.

How to cite this article : Thilagavathi, K. and Selvaraj, J. 2026. A rare case of pulmonary adenocarcinoma in Pattanam sheep Indian J. Vet. Pathol., 50(3) : 259-261.

A two-year-old female Pattanam sheep from an organised farm was submitted to the Department of Veterinary pathology, Veterinary College and Research institute, Orathanadu for necropsy. The flock was composed of 200 sheep. During necropsy, required tissue samples were collected and fixed in 10% formalin. The tissues were processed, sectioned and stained with Hematoxylin and Eosin (H&E) stain.

Grossly, the tracheal and bronchial lumen contained frothy exudate. Cranial lobe of left lung was adhered with white fibrinous membrane (Fig. 1). Left lung cranial lobe showed dark red firm consolidated areas with grey or pale nodular areas and on sectioning the pale areas, showed white granular appearance with oozing of frothy exudate (Fig. 2). Histopathologically, the

pleura was thick with sero-fibrinous exudate. The lungs revealed multifocal adenomatous appearance of the parenchyma. Hyperplasia of type II pneumocytes on the alveolar wall into cuboidal epithelium as well as columnar epithelium forming acinar pattern (Fig. 3, 4 & 6). In some places, the proliferation of type II pneumocytes on the alveolar wall projected into the lumen forming papillary projections (Fig. 5). In many alveoli, the epithelium desquamated into the lumen. Scattered areas showed moderate lymphocyte and macrophage infiltrations (Fig. 6). The bronchial lymph node showed congestion in the cortex with lymphoid depletion. The spleen also showed mild lymphoid depletion. There were no metastases of tumour cells.

The frothy exudate in tracheal and bronchial lumen as well as fibrinous adhesion in lungs was in accordance with previous report⁶. Lungs with dark red firm consolidated areas with grey or pale nodular areas and on sectioning the pale areas, showed white granular appearance with oozing of frothy exudate which was in agreement with earlier works^{1&6}. The lungs had multifocal adenomatous appearance with hyperplasia of type II pneumocytes into cuboidal epithelium as well as columnar epithelium forming acinar and papillary pattern. These findings were in strong agreement with earlier reports^{3&7}. The transformation of alveolar epithelial lining into cuboidal and columnar cells are pathognomonic for ovine pulmonary adenocarcinoma³. The epithelium desquamated in the alveolar lumen was observed earlier also⁶. The infiltration of alveolar macrophages surrounding the neoplastic foci was a consistent histologic feature but very little is known about their pathogenic role in OPA. The excessive surfactant like protein produced in this tumour may represent a stimulus for accumulation of macrophages⁶. The bronchial lymph node congestion and lymphoid depletion was in accordance with earlier report⁸ who also observed

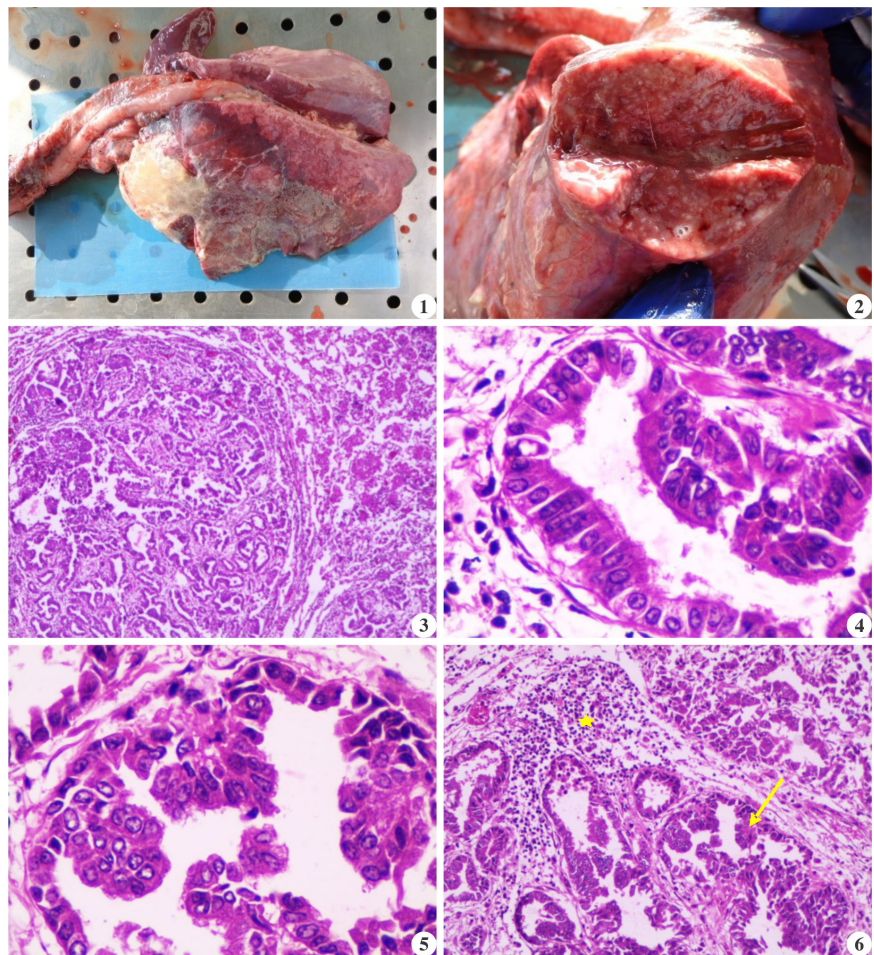


Fig.1. Lung showing fibrinous adhesion with grey nodules on the surface; **Fig. 2.** Lung on section showing granular appearance with frothy exudate; **Fig. 3.** Lung showing adenomatous appearance forming acinar pattern with papillary projections (H&E x 40); **Fig. 4.** Lung showing hyperplasia of alveolar type II pneumocytes into columnar cells (H&E x 400); **Fig. 5.** Lung showing proliferation of alveolar type II pneumocytes into cuboidal cells forming papillary projections. (H&E x 400); **Fig. 6.** Lung showing hyperplasia of alveolar type II pneumocytes into cuboidal cells forming acinar pattern with papillary projections (arrow). Around the alveoli interstitial tissue showing lymphocyte and macrophage infiltration (star) (H&E x 100)

moderate plasmacytosis in the medullary areas. In the present study, there were no metastases of tumour cells. In contrast, extra-thoracic metastases were found in the liver, kidneys, skeletal muscles, digestive system, spleen, skin and adrenal glands while intrathoracic metastases occurred in chest wall, regional lymph nodes, diaphragm and heart were reported⁹.

The present case is documented as the very rare incidence of pulmonary adenocarcinoma in a Pattanam sheep.

Financial support & sponsorship: None

Conflicts of Interest: None

Use of Artificial Intelligence (AI) Assisted technology for manuscript preparation: The authors confirm that there was no use of AI – Assisted Technology for assisting in the writing of the manuscript and no images were manipulated using AI

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