



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(7): 461-466
© 2023 TPI
www.thepharmajournal.com
Received: 01-04-2023
Accepted: 05-05-2023

Srinivasa Naik H
Livestock Research Station,
Sri Venkateswara Veterinary
University, Siddarampuram,
Andhra Pradesh, India

Chennappa P
Department of Veterinary
Pathology, CVSc, Tirupati,
Andhra Pradesh, India

Sailaja N
Department of Veterinary
Pathology, CVSc, Tirupati,
Andhra Pradesh, India

A rare case of pleural and peritoneal mesothelioma in a Nellore brown sheep

Srinivasa Naik H, Chennappa P and Sailaja N

Abstract

Mesotheliomas are malignant tumors arise from the cells of serous lining of body cavities and they may involve all the pleural, pericardial, and peritoneal cavities. Mesotheliomas are uncommon neoplasms in human beings and domestic animals, but are seen most commonly in cattle, horses, dogs and cats. A four years-old Nellore brown ewe suffered with severe respiratory distress for a period of few days and died. Carcass was examined thoroughly and necropsy was carried out and collected samples were processed by routine embedded in paraffin and sections stained with hematoxylin-eosin. Necropsy of died sheep revealed, 2.5-3 liters of haemorrhagic fluid mixed with little fibrin threads in the thoracic cavity. Very minute to medium, medium to large coalescing whitish to yellowish cauliflower like tumor nodules was noticed on the parietal surface of pleura covered on lungs, pericardium, medial surface of costal ribs and sternum. Proliferation of neoplastic cell arranged in to acinar pattern with papillary projections surrounded infiltrates of inflammatory cells including plasma cells observed in the pleura, lung parenchyma, pericardium and metastatic lesions in the mediastinal lymph nodes. Based on gross and histopathological findings present case diagnosed as pleural and pericardial mesothelioma in a Nellore brown sheep.

Keywords: Mesothelioma, pleura, pericardium, sheep

Introduction

Normally mesothelial cells form a monolayer on the serosal surface of pleura, pericardium and peritoneum. Mesotheliomas are malignant tumors arise from the cells of serous lining of body cavities and they may involve all the pleural, pericardial, and peritoneal cavities, including the tunica vaginalis. Mesothelioma is uncommon neoplasms in human beings and domestic animals, but are seen most commonly in cattle, horses, dogs and cats. Few reports are there in wild cats and laboratory guinea pigs. The relationship between mesothelioma and asbestos in human beings is striking (Butnor *et al.* 2001) [4] and was just established in few canine reports also. Whereas in cattle, peritoneal mesothelioma often are congenital (Brown *et al.* 2007) [3]. Various pesticides act as a co factor that apparently increases the risk of mesothelioma in the animals. Histologically, mesothelioma exists both in benign and malignant forms in domestic animals, but benign tumours are uncommon, many pathologists believe that all the mesotheliomas are potentially malignant as all spreads by implantation rather than metastasis (Brown *et al.* 2007) [3]. Three varieties, predominantly epithelioid, fibrous and biphasic or mixed types were described in domestic animals. Eithelioid and biphasic mesotheliomas are the most common types in dogs, horses and cats (Head *et al.* 2002) [10]. Occurrence of Mesothelioma in sheep is very rare, only few reports were found. In the present report we describe a very rare presentation of pleural and pericardial mesothelioma in an adult Nellore brown sheep.

Materials and Methods

A four years old Nellore brown ewe suffered with severe respiratory distress and died. Carcass was examined thoroughly and necropsy was carried out and recorded all the gross abnormalities of internal organs and collected represented tissue samples in 10% neutral buffered formalin. Samples were processed by routine embedded in paraffin. Sections of 5 µm thickness were cut, stained with hematoxylin-eosin and studied microscopically.

Corresponding Author:
Srinivasa Naik H
Livestock Research Station,
Sri Venkateswara Veterinary
University, Siddarampuram,
Andhra Pradesh, India

Results and Discussion

Gross changes

A four years old Nellore brown ewe was suffered from severe dyspnea, with slow gait. Later it was recumbent for a period of three days and died in an organized sheep farm. Body temperature, feeding and watering were normal with congested conjunctival mucosa during the course of illness. Body condition of the carcass was little emaciated with rough hair coat. Up on post mortem examination, carcass revealed, 2.5-3 liters of haemorrhagic fluid mixed with little fibrin threads in the thoracic cavity. Very minute to medium, medium to large coalescing whitish to yellowish cauliflower like tumor nodules was noticed on the parietal surface of pleura covered on the lungs, pericardial sac and medial surface of costal ribs and sternum (Fig 1 to Fig 4). Neoplastic growths were soft in touch. Apical lobe of left lung was firm and meaty in appearance up on cut section, other lobes were little firm and no froth was noticed in the bronchi and bronchioles. Similar findings were noticed in various mesothelioma cases of pleura, pericardium and peritoneum of domestic animals by earlier authors of Leisewitz *et al.* (1991)^[1], Brown *et al.* (2007)^[3], Sevil *et al.* (2007)^[3], Ellen B Wiender *et al.* (2008)^[6], Haruka Suzuki *et al.* (2017)^[9].



Fig 1: Lungs: Note multifocal to diffuse coalescing whitish nodules on the visceral surface of the pleura



Fig 2: Thoracic cavity: Diffuse nodular growths spread on the medial surface of rib cage and sternum and pleura



Fig 3: Ribs: Note small whitish nodular growths on the medial surface of the thoracic rib cage



Fig 4: Pericardium: Note water in the pericardial sac along with whitish nodular growths on the pericardium

Small to medium coalescing nodules were encircled entire pericardial sac. 20-30 ml straw colored fluid was found in the pericardial sac. Pericardial sac was thickened. Small petechiae to patchy hemorrhages were seen on the epicardium and endocardium (Ellen B Wiender *et al.* (2008)^[6]). Mucosa of abomasums, small intestine and large intestine were congested. Peritonium and mesentric lymph nodes were without any gross malignant lesions. Nellore brown ewe was in advanced pregnancy. Foetus and foetal membrane were normal without any neoplastic growths. No detectable abnormalities were noticed in livers, spleen, kidney and brain. Majority of the gross findings of the present case are in concurrence with the earlier reports of Brown *et al.* (2007)^[3], Ellen B Wiender *et al.* (2008)^[6], Haruka Suzuki *et al.* (2017)^[9].

Microscopic Changes

Pleura were thickened with diffuse sub pleural infiltrates of various inflammatory cells, including plasma cells. Neoplastic cells infiltrated into the lungs alveoli along with congestion of alveolar capillaries were noticed. Multiple neoplastic cells arranged into acinar pattern with papillary projections surrounded by loose connective tissue in major part of the pleura. In few pockets, cells also arranged into sarcoid pattern on loose connective tissue. Neoplastic proliferated area

surrounded by diffuse cellular infiltration. Tumor cells were oval to elongated with basophilic cytoplasm, and nucleus having loose chromatin with multiple nucleoli (Fig 5 to Fig 8).

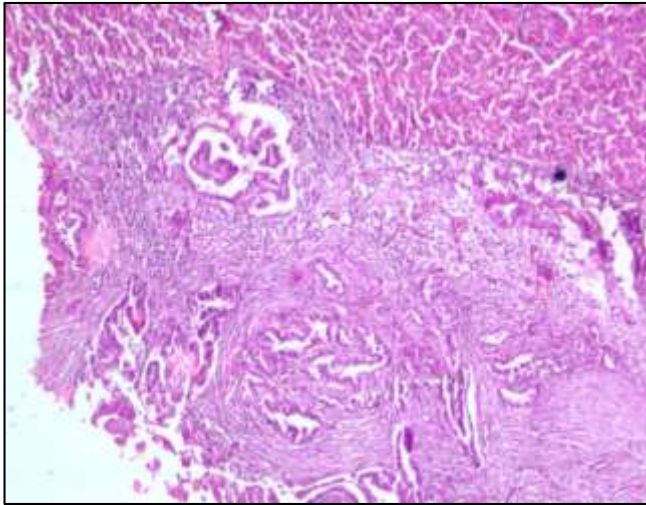


Fig 5: Pleura: Multiple neoplastic acinar structures with papillary projections surrounded by loose connective tissue (HE.x4)

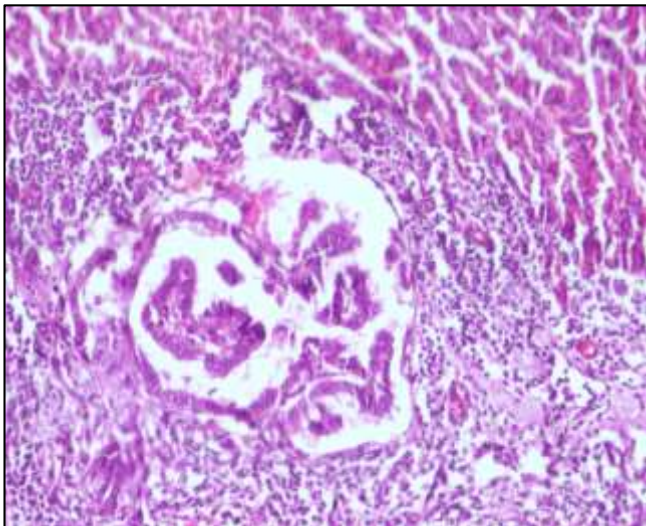


Fig 6: Pleura: Proliferation of neoplastic cells arranged into acinar structure with papillary projections surrounded by diffuse cellular infiltration (HE. X10)

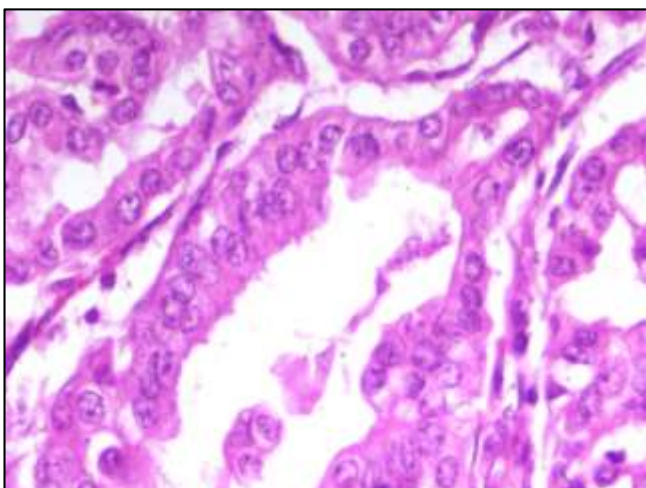


Fig 7: Pleura: Note oval to elongated neoplastic cells, basophilic cytoplasm, loose chromatin with multiple nucleoli (HE.x40)

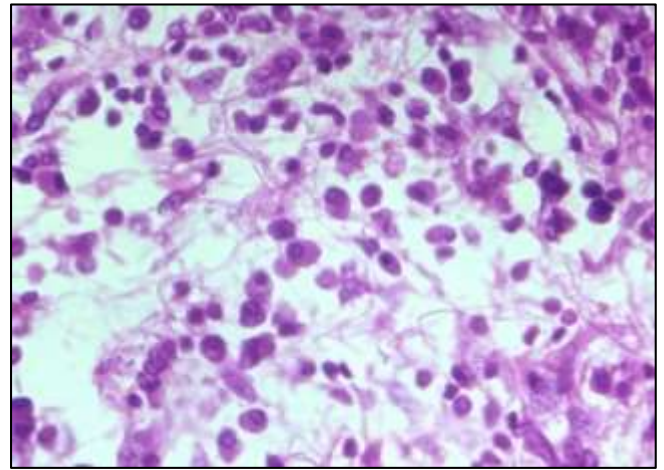


Fig 8: Pleura: Note diffuse plasma infiltration in the pleura (HE.x10)

Papillary solid outgrowths were seen on the surface of lungs supported by loose connective tissue. Neoplastic cells were anisocytic with loose chromatin and multiple nucleoli. Thickened pleura, sub pleural metastatic papillary mesothelial growths, and atelectasis of lung alveoli were noticed in focal areas of lungs. Emphysema, congestion, hemorrhage and oedema of lung parenchyma were also observed in some other focal areas of lungs. Peribronchial and alveolar congestion, and bronchial epithelial hyperplasia was noticed in few areas of lungs (Fig 9 to Fig 14).

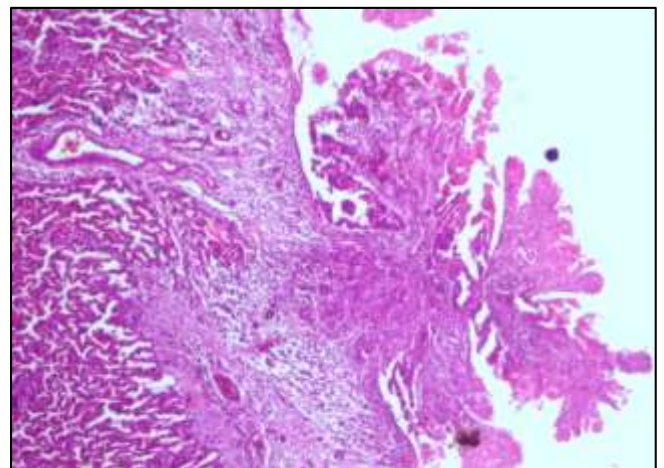


Fig 9: Lungs: Papillary outgrowth of lungs supported by loose connective tissue (HE.x4)

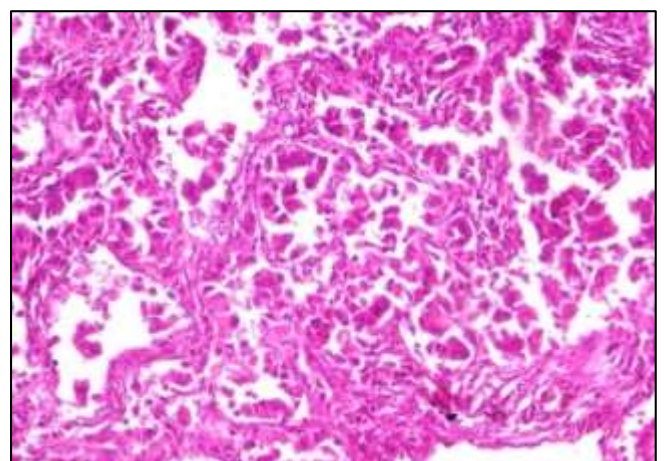


Fig 10: Lungs: Proliferated of neoplastic cells arranged in to papillary pattern (HE.x10)

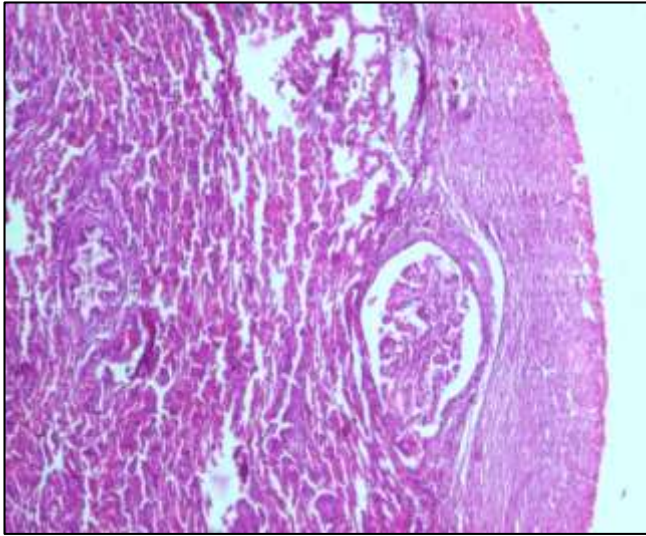


Fig 11: Lungs: Thickened pleura, sub pleural metastatic papillary mesothelial growths, and atelectasis of lung alveoli (HE.x4)

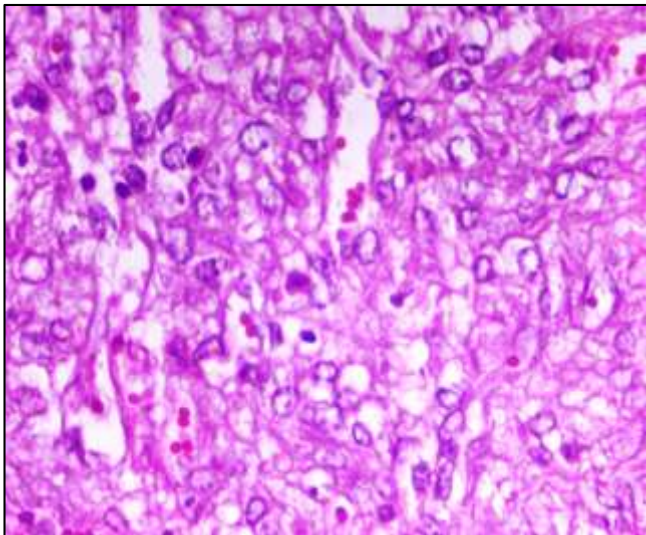


Fig 12: Lungs: Note anisocytic basophilic neoplastic cells with multiple nucleoli, hemorrhage in the alveolar parenchyma (HE.x40)

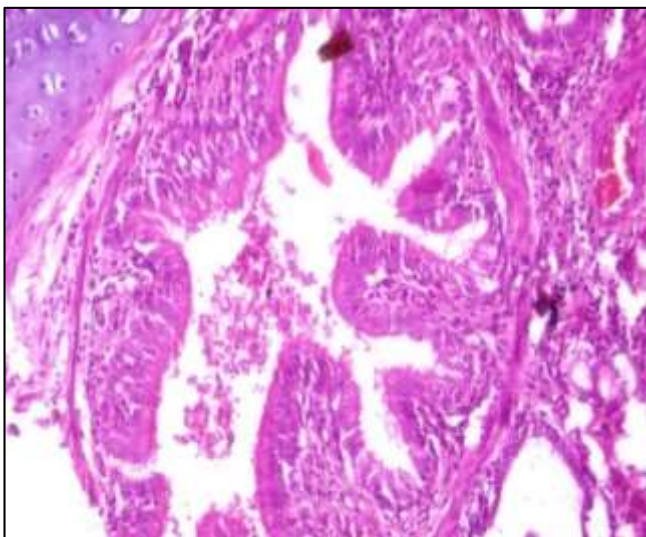


Fig 13: Lung: Bronchial epithelial hyperplasia and congestion of peri bronchial vessels (HE.x10)

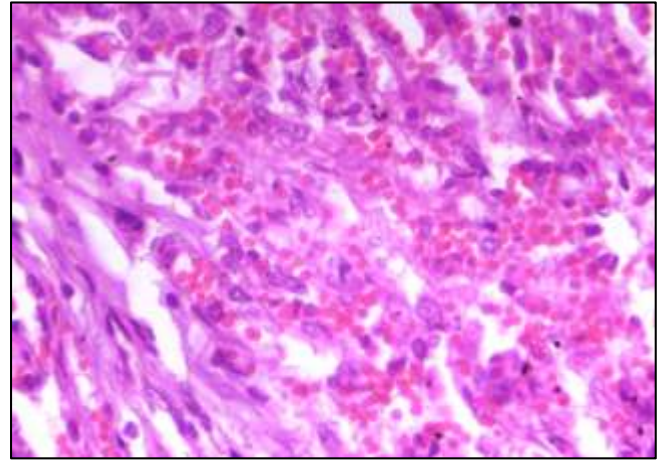


Fig 14: Lung: Alveolar congestion (HE.x10)

Multiple acinar structures with papillary pattern of proliferated neoplastic cells surrounded by loose connective tissue along with infiltrates including plasma cells observed in the pericardium. Cells are elongated, basophilic with multiple nucleoli. Multiple neo vascular proliferation in the pericardium also noticed. Hemorrhage, and infiltration of plasma cells observed in focal areas of the pericardium (Fig 15 to Fig 20)

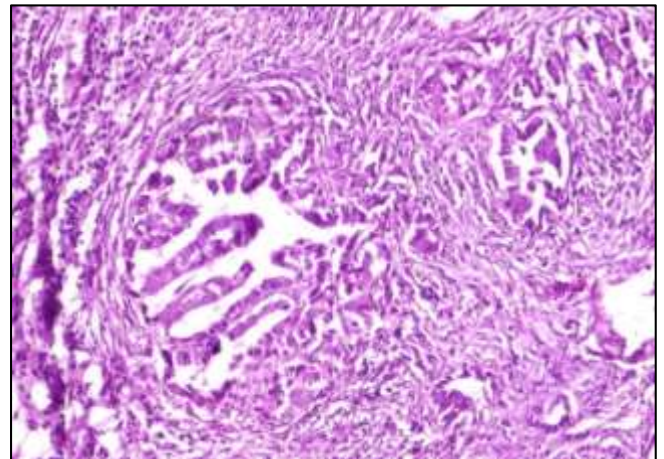


Fig 15: Pericardium: Note multiple acinar structure with papillary pattern of proliferated neoplastic cells surrounded by connective tissue along with infiltrates (HE.x10)

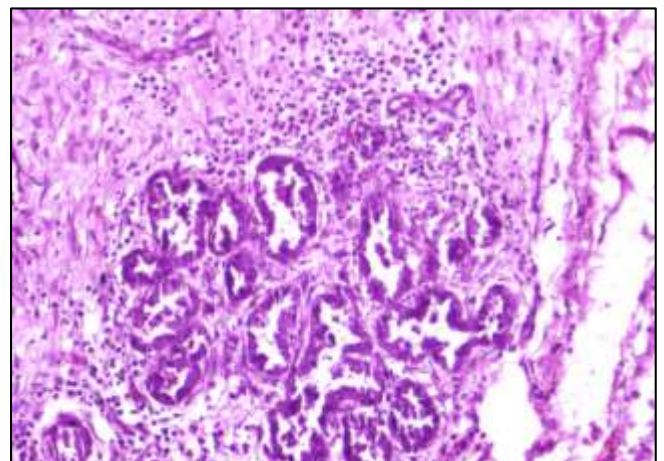


Fig 16: Pericardium: Note multiple acinar structure with papillary pattern of proliferated neoplastic cells surrounded by connective tissue along with infiltrates (HE.x10)

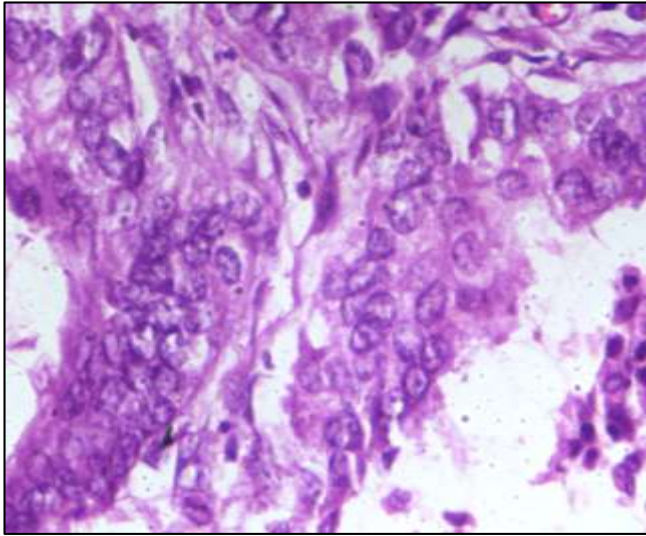


Fig 17: Pericardium: Note diffuse elongated neoplastic cells with multiple nucleoli (HE.x40)

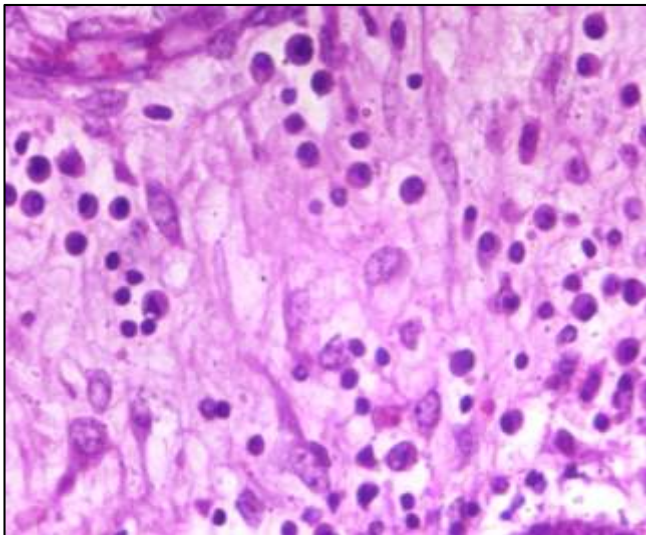


Fig 18: Pericardium: Infiltration of plasma cells in the pericardium (HE.x40)

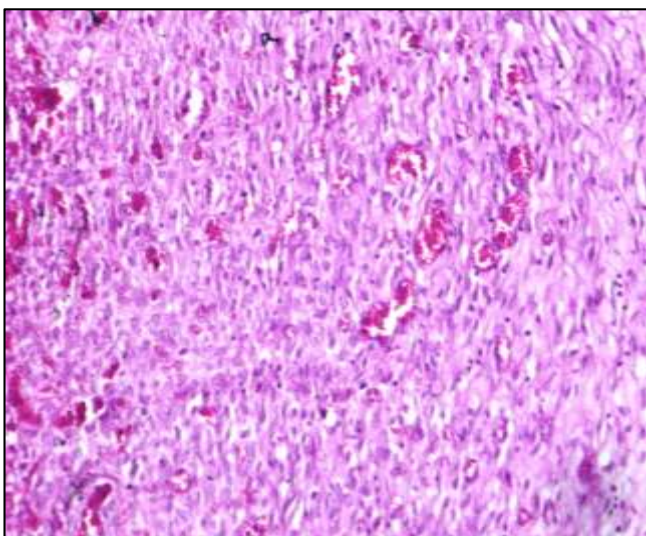


Fig 19: Pericardium: Note multiple neovascular proliferation in the pericardium (HE.x10)

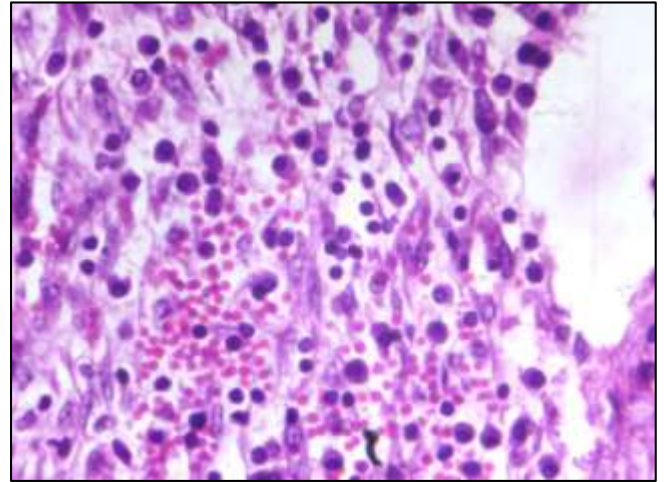


Fig 20: Pericardium: Hemorrhage, and infiltration of plasma cells in the pericardium (HE.x40)

Metastatic neoplastic growths seen in the mediastinal lymph nodes. Sub capsular papillary projection arranged into papillary pattern and extended into the cortical region of mediastinal lymph nodes were observed (Fig 21 & 22). Microscopic changes observed in the present case are in close resemblance with the earlier reports of Karimi *et al.* (2006)^[11], Brown *et al.* (2007)^[3], Ellen B Wiender *et al.* (2008)^[6], Haruka Suzuki *et al.* (2017)^[9], and Fletcher *et al.* (2020)^[7].

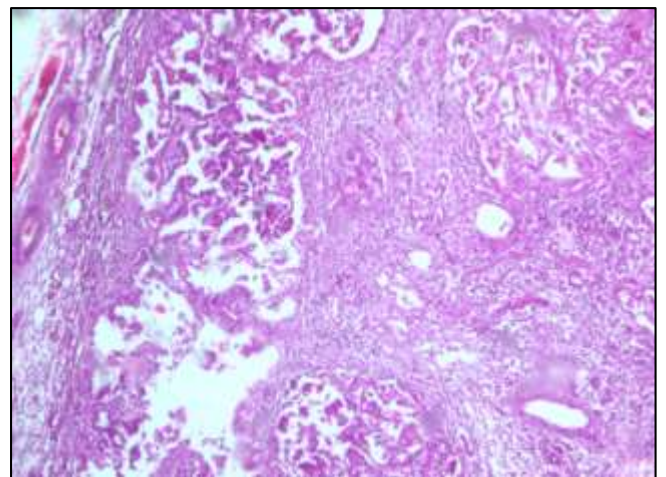


Fig 21: Sub capsular papillary projection of mediastinal lymph nodes (HE.x10)

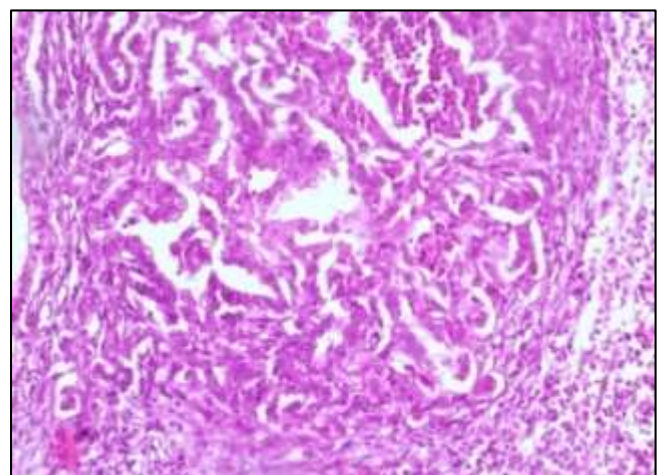


Fig 22: Neoplastic cellular proliferation arranged into papillary pattern in the cortical region of mediastinal lymph nodes (HE.x10)

Mesothelioma arises from the cells lining the pleura, pericardium and peritonium including tunica vaginalis and are rare in domestic animals. Few authors only reported peritoneal and pleural mesothelioma in sheep (Karimi *et al.* (2006) [11], and Fletcher *et al.* 2020) [9]. Cause of the present case was not determined, but in human beings and in few canine reports asbestos is striking (Butnor *et al.* 2001) [4]. Whereas in cattle, peritoneal mesothelioma often are congenital (Brown *et al.* 2007) [3]. Various pesticides act as a co factor that apparently increases the risk of mesothelioma in the animals. Present case of pleural and pericardial mesothelioma is a papillary malignant type and metastasized to mediastinal lymph nodes. Mesothelioma founds in three varieties, predominantly epithelioid, fibrous and biphasic or mixed types. Eithelioid and biphasic mesotheliomas are the most common types in dogs, horses and cats (Head *et al.* 2003) [10].

Conclusion

Clinical, necropsy and histopathological examination of present case lead to a definitive diagnosis of a rare pleural and pericardial mesothelioma in a Nellore brown sheep.

Acknowledgement

Authors are thankful to the Sri Venkateswara Veterinary Veterinary University, Tirupati for providing facilities to carry out sample processing and analysis at the Department of Veterinary Pathology, College of Veterinary Science, Tirupati.

References

1. Leisewitz AL, Nesbit JW. Malignant mesothelioma in a seven-week-old puppy. *Journal of the South African Veterinary Association.* 1991;63(2):70-73.
2. Bacci B, Morandi F, De Meo M, Marcato PS. Ten cases of feline mesothelioma: an Immunohistochemical and Ultrastructural study. *Journal of Comparative Pathology.* 2006;134:347-354.
3. Brown C, Baker D, Barker I. Alimentary system, In: *Pathology of domestic Animals*, Jubb, Kennedy and Palmer (Grant Maxie, M Ed), Elsevier Saunders, ISBN 13-978 0 7020-2785-7, China; c2007. p. 1-296,
4. Butnor K, Sporn T, Hammar S, Roggli V. Well differentiated papillary mesothelioma. *Am J Surg pathol.* 2001;25:1304-1309.
5. Daniell Brolo Maritins, Giancarlo Souza S, Josaine Pedrozo CSR, Cinthia Mazzanti M, Alexandre Mazzanti, Diego Backmann V, *et al.* Thoracic and abdominal mesothelioma in a dog: acytologists view. *Comp Clin Patholo.* 2011;20:289-293
6. Elien Wiender B, Ramiro Isaza, William Lindsay A, Allison Cse L, Joshua Deeker, John Roberts. Pericardial mesothelioma in a Bengal Tiger (*Panthers tigris*). *American Association of Zoo Veterinarians.* 2008;39(1):121-123.
7. Fletcher, Nicola Brena F, CaRSON, Amanda Wessels, Mark, Floyd, Tobias. Mesothelioma in two sheep with pericardial effusion and ascities. *BMJ*, 2020.
8. Frank AO, Toledo, Aline DBB, Goncalves, Mariela Toscano F, Edurado Fazzano H, *et al.* Diffuse thoracic and peritoneal papillary mesothelioma in an adult cow: case report. *Brazilian Journal Veterinary Pathology.* 2018;11(2):68-75.
9. Haruka Suzuki, Ken-ichi Wantanabe, Noriyuki Horiuchi, Yoshiyasu Kobayashi and Hisashi Inokuma. Pericardial

- mesothelioma with severe congestive heart failure in a Holstein cow. *Japanese Journal of Veterinary Research.* 2017;65(3):167-172.
10. Head KW, Else RW, Dubielzig RR. Tumors of the alimentary tract. In. D.J meuten (ed) *Tumours In Domestic Animals.* Ames. Iowa State Press, Fourth edition, 2002, Pp 401-481.
11. Karimi I, Nourani H, Mahzounieh M. Pleural mesothelioma in a sheep. *Pakistan Journal of Biological Sciences.* 2006;9(10):2006-2008.
12. Sevil Ataly Vural, Zafer Ozyildiz, Sule Yurdgul Ozsoy. Pleural mesothelioma in a nine month-old dog. *Irish Veterinary Journal.* 2007;60(1):30-33.