Indian J. Vet. Pathol., 49(2) : 185-187, 2025: DOI: https://doi.org/10.56093/ce4msg72

CASE REPORT

A rare case of cystic renal cell carcinoma in a sheep

H. Srinivasa Naik, S.D. Koushar Sahara*, C. Jyothi, C. Yugandhar and V. Gnani Charitha[1]
Department of Veterinary Pathology, College of Veterinary Science, Proddatur, Sri Venkateswara Veterinary University, Tirupati, [1]Department of Veterinary Parasitology, College of Veterinary Science, Proddatur

Address for Correspondence
S.D. Koushar Sahara, Department of Veterinary Pathology, College of Veterinary Science, Proddatur, Sri Venkateswara Veterinary University, Tirupati, India, E-mail: kousharsahara111@gmail.com

Received: 21.3.2025; Accepted: 15.4.2025

ABSTRACT

An eight-month-old ram lamb was presented to the Department of Veterinary Pathology, College of Veterinary Science, Proddatur, for necropsy with the history of anorexia, dyspnea, lethargy and emaciation. The post-mortem examination revealed clear serous fluid in the abdominal cavity, pale liver with a distended gall bladder, and enlarged, pale, pulpy kidneys with multi focal white necrotic areas on their surface. Cytological evaluation of kidney impression smears showed clusters of cuboidal epithelial cells, along with degenerative neutrophils, lymphocytes, and a few bipolar microorganisms. The neoplastic epithelial cells exhibited anisocytosis, homogenous bluish cytoplasm and large, pleomorphic nuclei with 3-5 prominent nucleoli. Mitotic figures were observed in the nuclei. Additionally, a few macrophages and multinucleated cells were found within the neoplastic clusters. Histopathological examination revealed diffusely dilated and cystic tubules, proliferation of tubular epithelial cells, infiltration of lymphocytes and degenerated neutrophils. Focal areas of glomerular dilatation were also observed. The tubular epithelial cells appeared polygonal to cuboidal, with basophilic cytoplasm and pleomorphic, dense nuclei containing prominent nucleoli. A few mitotic figures were also noted. Based on the gross, cytological and histopathological findings, the case was diagnosed as "Cystic Renal Cell Carcinoma" which is a rare neoplasm in sheep.

Keywords: Carcinoma, kidneys, renal cell carcinoma, sheep

Primary renal neoplasms have been documented in both animals and humans. These tumors are typically classified based on their origin into four categories: epithelial tumors of the renal parenchyma, epithelial tumors of the renal pelvis, nephroblastic tumors and mesenchymal tumors. They can be further categorized by predominant histological patterns; such as solid, tubular, or papillary type. According to their cytological characteristics, they may be clear cell, granular eosinophilic or basophilic and either cuboidal or columnar. The prevalence of primary renal neoplasm in domestic animals is less than one percent of total neoplasm reported. They are usually unilateral and can be of epithelial, mesenchymal or embryonic origin. Adenocarcinoma of the kidney arises from renal tubular epithelium[1]. While some tumors exhibit uniform characteristics, it is common to observe multiple histological patterns within different areas of the same tumor. Among these neoplasms, renal adenocarcinomas are the most prevalent (89%), followed by nephroblastomas (9%) and sarcomas (2%). Most primary tumors are epithelial and they are largely reported as benign in cattle[2] and malignant in horses[3]. Naturally occurring renal adenocarcinomas are quite rare in lower animals but have been reported in rats, mice, guinea pigs, rabbits, monkeys, sheep, cows, pigs, dogs, horses, various fowl and fish[4]. Renal carcinomas are the most common primary renal neoplasm and occur most frequently in older dogs and occasionally in sheep, they must be distinguished from metastatic tumor nodules[1,5]. However, in laboratory animals renal adenocarcinomas are readily induced by a variety of carcinogens including chemical, physical, and viral agents. Although hormones (estrogens) have not been used successfully to induce renal adenocarcinoma in species other than hamsters[6]. Renal carcinomas are the most common primary renal neoplasm and occur most frequently in older dogs[7]. The Ecker rat is a useful model for hereditary renal cell carcinoma[2]. immunosuppression in solid-organ-transplant recipients and obesity have been identified as risk factors for renal cell carcinoma[8]. The purpose of this report is to provide gross, cytology and histopathological descriptions of renal cell carcinoma in Sheep.

How to cite this article : Naik, H.S., Sahara, S.D.K., Jyothi, C., Yugandhar, C. and Charitha, V.G. 2025. A rare case of cystic renal cell carcinoma in a sheep. Indian J. Vet. Pathol., 49(2) : 185-187.

An eight-month-old ram lamb was presented to the Department of Veterinary Pathology, College of Veterinary Science, Proddatur, for necropsy following a history of anorexia, dyspnea, lethargy and emaciation. Detailed postmortem was conducted and recorded all gross abnormalities, taken tissue imprints for cytological examination, collected representative tissue pieces in 10% buffered formalin and processed as per the standard histopathological procedure for histopathological examination[8]. Formalin-fixed tissues were embedded in paraffin, sectioned

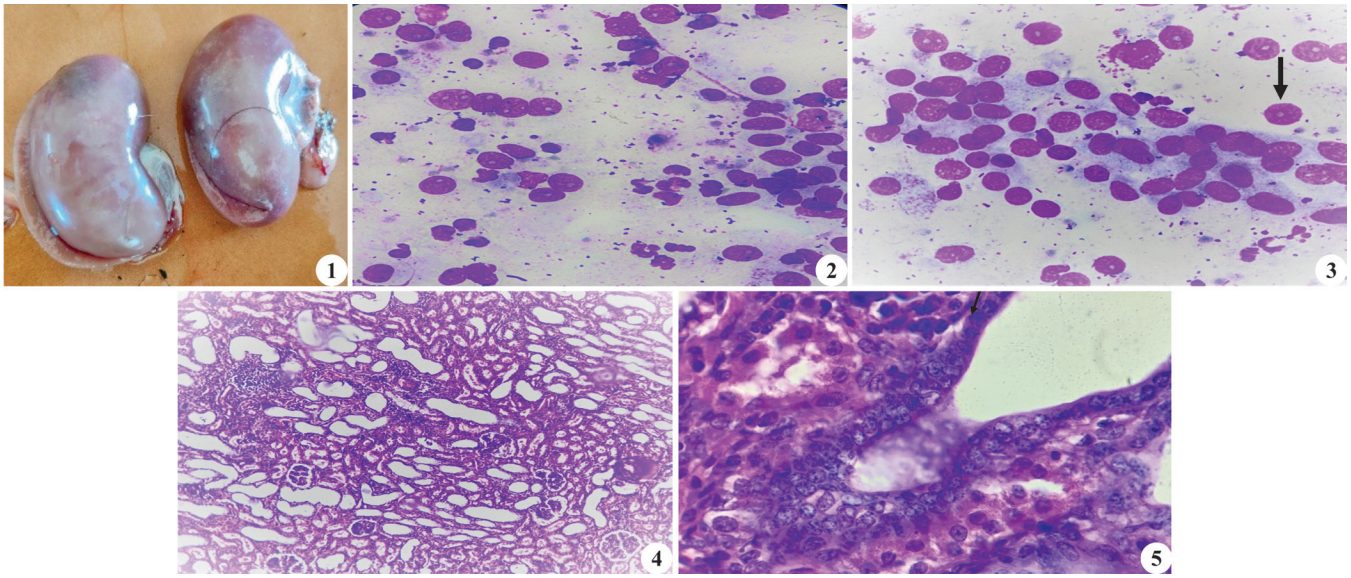

Fig. 1. Pale, enlarged pulpy kidneys showing small circumscribed multiple white foci on the surface of the kidney; **Fig. 2.** Cluster of cuboidal epithelial cells along with degenerative neutrophils, lymphocytes, and a few bipolar microorganisms (Giemsa Stain X100); **Fig. 3.** Neoplastic epithelial cells showing anisocytosis, with fairly homogenous bluish cytoplasm, and large, pleomorphic nuclei with 3-5 prominent dark stained nucleoli, and mitotic figures (Giemsa Stain X100); **Fig. 4.** Cystic dilatation of tubules along with proliferation of tubular epithelial cells and dilated glomeruli (H&E X10); **Fig. 5.** Tubular neoplastic epithelial cells showing anisocytosis, with fairly homogenous bluish cytoplasm, and large, pleomorphic nuclei with 3-5 prominent dark stained nucleoli, and mitotic figures (H&E X100).

at 5 µm, stained with Giemsa, examined under light microscopy. Serous fluid from abdominal cavity & 10 ml of urine sample from urinary bladder were collected for further investigation.

The post-mortem examination revealed 500 ml of clear serous fluid in the abdominal cavity. The liver was pale with a distended gall bladder, while the kidneys were enlarged, pale, pulpy with multifocal white necrotic areas on the surface (Fig. 1)[1]. The heart appeared pale, with empty chambers. Both lungs were mildly congested with frothy fluid on cut section of bronchi and bronchioles. The rumen was mildly distended with feed content. No abnormalities were detected in the genital organs, brain or spinal cord. Pale subcutaneous fat was noted. Cytological evaluation of kidney impression smears showed clusters of neoplastic cuboidal epithelial cells, along with degenerative neutrophils, lymphocytes, and a few bipolar microorganisms[3] (Fig. 2). The neoplastic epithelial cells exhibited anisocytosis, with fairly homogenous bluish cytoplasm large, pleomorphic nuclei with 3-5 prominent dark-stained nucleoli and mitotic figures[1,3] (Fig. 3). Histopathological examination of kidney revealed diffusely dilated and cystic tubules, proliferation of tubular epithelial cells, infiltration of lymphocytes and degenerated neutrophils[3] (Fig. 4). Focal areas of glomerular dilatation were also observed. The tubular epithelial cells appeared polygonal to cuboidal with basophilic cytoplasm and pleomorphic, dense nuclei containing prominent nucleoli[3] (Fig. 5). Cell morphology varied from cuboidal, columnar to polyhedral with clear or granular eosinophilic cytoplasm[1]. Nuclei ranged from small, round, and granular to large, oval, vesicular, and pleomorphic. Neoplastic renal parenchyma showed a moderate fibrovascular stroma[1]. The liver showed central venous congestion. Mild pneumonic changes observed in lungs with no evidence of neoplasia. Other organs, including genital organs, brain, rumen, intestines and heart did not show any significant cytological & histopathological changes apart from the kidneys. Urine analysis was negative for glucose. Known causes of renal cell carcinomas in animals include chemical carcinogens such as nitrosamines, nitrosureas, aromatic amines, tri (2,3 dibromopropyl) phosphate, and cadmium[2]. In humans, asbestos, cigarette smoking, coffee consumption, phenacetin and diuretics have been linked to renal cell carcinoma[7]. In cattle, exposure to aflatoxin and lead has been linked to renal carcinoma, both of which are well-documented causes of renal cell carcinoma in rats[2].

Neoplasms in sheep are relatively rare compared to other domestic animals, with most reported cases involving the lymphatic, respiratory, and urinary systems. Commonly observed tumors include enzootic nasal adenocarcinoma, pulmonary adenomatosis (Jaagsiekte), squamous cell carcinoma, lymphosarcoma, and renal cell carcinoma. Among these, enzootic nasal adenocarcinoma and pulmonary adenomatosis are more frequently encountered due to their viral etiology. In contrast, renal cell carcinoma and other epithelial tumors remain rare, often diagnosed incidentally during post-mortem examinations. Environmental factors, genetic

predisposition, and exposure to carcinogens such as aflatoxins and heavy metals may contribute to neoplastic development in sheep. The present case report describes the gross, cytological, and histopathological features of a rare "cystic renal cell carcinoma" in an adult sheep, diagnosed incidentally during post-mortem examination.

ACKNOWLEDGEMENT

The authors are thankful to the College of Veterinary Science, Sri Venkateswara Veterinary University, Proddatur for providing lab facilities at Department of Veterinary Pathology for carrying above research work.

REFERENCES

1. Mohajeri D, Ghafour M, Yousef D, Ali R and Asadnasab GHR. 2008. Renal adenocarcinoma in a sheep: surgical and histopathological findings. *Iranian J Vet Surg* **3:** 87-91.
2. Kelley LC, Crowell WA, Puette M, Langheinrich KA and Self AD. 1996. A retrospective study of multicentric bovine renal cell tumors. *Vet Pathol* **33:** 133-141.
3. Sandison AT and Anderson LJ. 1968. Tumors of the kidney in cattle, sheep and pigs. *Cancer* **21:** 727-742.
4. Bennington JL and Kradjian RM. 1967. Renal Carcinoma Philadelphia WB and Saunders Co. 1967.
5. Meuten DJ. (Ed.) 2020. Tumors in domestic animals. John Wiley & Sons. 5th edn. NC USA.
6. Bennington JL. 1973. Cancer of the kidney etiology, epidemiology, and pathology. *Cancer* **32:** 1017-1029.
7. Carlton WW and McGavin MD. 2001. Special veterinary pathology. 3rd edn London: Mosby: 270-275.
8. Mobaraki G, Shi S, Smits KM, Severens K, Lommen K, Rennspiess D and Hausen AZ. 2024. Bovine Meat and Milk Factor-like Sequences Are Frequently Detected in Renal Cell Carcinoma Tissues. *Cancers* **16:** 1746.