The Haryana Veterinarian (June, 2025) **64(1),** 128-130 ISSN 0033-4359 (P)

Clinical Article

CYTOLOGY: AN IMPORTANT TOOL FOR DIAGNOSING TRANSITIONAL CELL CARCINOMA IN A DOG

SONALI MISHRA*, RAKESH KUMAR, RAJESH KUMAR ASRANI,
RAJENDRA DAMU PATIL and DEEPTI SHARMA[1]
Department of Veterinary Pathology, [1]Department of Veterinary Surgery and Radiology
Dr. G.C. Negi College of Veterinary and Animal Sciences, CSKHPKV, Palampur-176062, India

Received: 03.07.24; Accepted: 19.09.24

SUMMARY

A female Pointer dog of 11 years was presented in the clinics of Dr. G.C. Negi College of Veterinary and Animal Sciences, Palampur, Himachal Pradesh. The animal was presented with a history of haematuria, decreased urine production along with straining, and reduced appetite and water intake since 10-15 days. Blood along with catheterized urine samples were taken for haemato-biochemical and urinalysis studies, respectively. Ultrasound and microscopic examinations (cytology and wet smear) of urine samples were indicative of Transitional Cell Carcinoma (TCC). The owner refused further treatment in this regard and the animal was given supportive therapy only.

Keywords: Cytology, Transitional cell carcinoma, Urine analysis

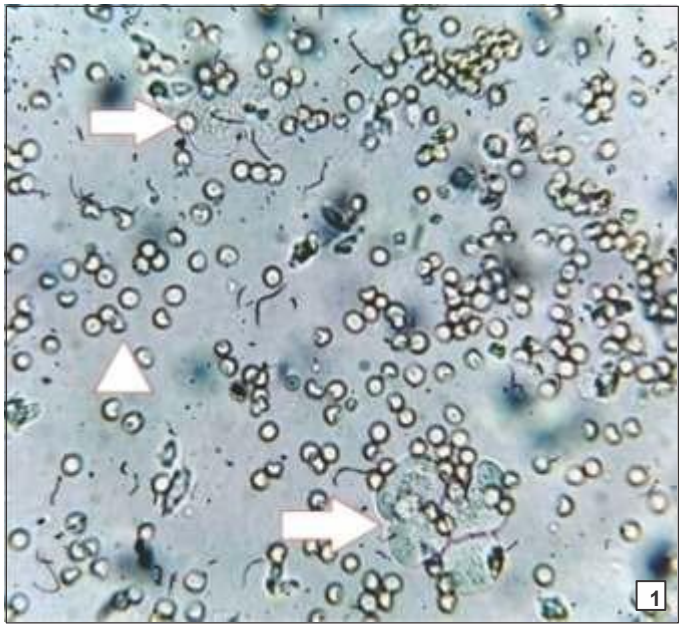
How to cite: Mishra, S., Kumar, R., Asrani, R.K., Patil, R.D. and Sharma, D. (2025). Cytology: an important tool for diagnosing transitional cell carcinoma in a dog. *The Haryana Veterinarian* **64(1)**: 128-130.

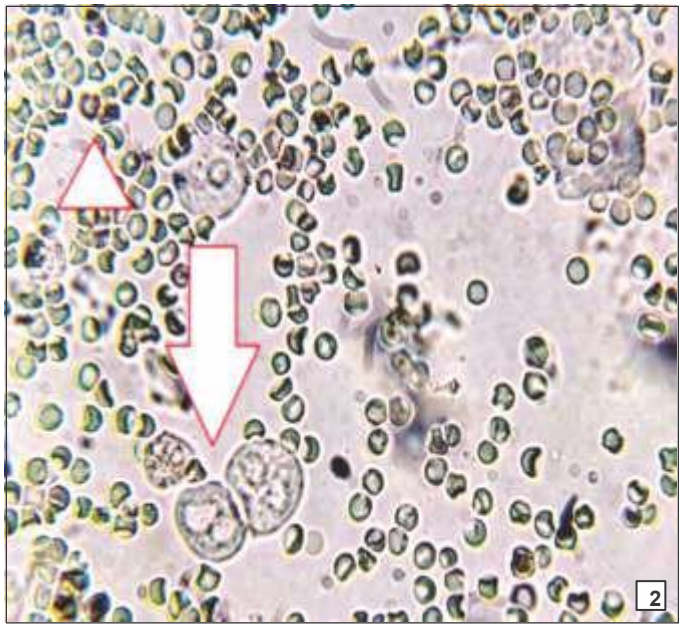
Urothelial carcinomas popularly known as transitional cell carcinomas (TCC) are invasive cancers affecting thousands of dogs worldwide annually (Christopher *et al.*, 2015). Although urinary bladder cancers are 2% of the total cancers of dogs, transitional cell carcinoma is the most common form of urinary bladder cancerin dogs (Knapp *et al.*, 2014). Variation in the clinical signs is caused by tumour size and location which can be trigonal or urethral leading to difficulty in urination and/or partial/complete obstruction of the urethral tract (Knapp and McMillan, 2013; Knapp *et al.*, 2014). The incidence of TCC is more in neutered dogs, females, obese, those having recurrent urinary tract infections and dogs exposed to lawn herbicides or pesticides (Glickman *et al.*, 2004; Knabb *et al.*, 2014). In a few reports, distant metastasis has been documented in 58% (80/137) of TCCs in dogs during necropsy, which was confirmed by cytology and histopathology. Apart from sequelae to metastasis TCC puts dogs at high risk of urinary tract infections (UTI) with resistant antibiotic treatments (Christopher *et al.*, 2015). The predisposing factors for TCC include many variables such as breed, age, sex, castration or spaying status, exposure to lawn herbicides or insecticides, obesity and recurrent UTIs (Glickman *et al.*, 2004; Knabb *et al.*, 2014). Due to similarities in urothelial invasive TCCs in humans and dogs, any promising results in canines can be translated to humans in future (Knapp *et al.*, 2014).

One such case Ca-1613 was presented to the Veterinary Clinics of Dr. G.C. Negi COVAS, with a history of haematuria, decreased urine production along with straining, and reduced appetite and water intake for 10-15 days. Serum creatinine and BUN (Blood urea nitrogen) levels were slightly elevated along with mild leukocytosis (Tables 1 and 2). Urine sample was also collected after aseptic catheterization of the bladder, revealing alkaline urine, proteinuria, hematuria, leukocyturia and a few casts in urine. Direct wet mount examination of a urine sample (a drop of urine sample was placed over the slide and a cover slip was placed revealing the presence of multiple RBCs with anisocytosis and anisokaryosis in transitional cells (Figs.1 and 2).

Giemsa staining was done on the sediment portions of a urine sample to increase the cellularity in the urine sample and smears were air dried, fixed with methanol and put to staining with a working solution of Giemsa stain (1 part Giemsa: 9 parts distilled water). Examination of these smears revealed the presence of multiple pleomorphic cells, hyperchromasia, anisokaryosis, anisocytosis and mitotic figures (Fig. 3) as documented by many authors in cytological analysis for various neoplastic conditions (Soni *et al.*, 2023; Begum *et al.*, 2023). The presence of bacterial colonies and neutrophils in this case, as shown in Fig. 4, which explains the signs of urinary tract infections in cases of TCC (Christopher *et al.*, 2015). Fig. 5 depicts the presence of atypical nuclei of the cells, with the presence of cercariform cells- CC cells (fishtail appearance), pearly formations (cells attached in strings of pearls fashion) with vacuolated cytoplasm and syncytial cells as seen by other authors too (Dey *et al.*, 2005). Ultrasound findings revealed the presence of hyperechoic irregular and nodular structures present at the neck of the bladder (trigone region) with increased vascularity evident in colour Doppler USG as

*Corresponding author: sonalimishra2299@gmail.com





Figs. 1 and 2. Wet mount (40X) revealed multiple RBCs (white triangle) and transitional cells showing marked anisocytosis and anisokaryosis (white arrow) arranged in clusters giving suspicion for TCC, respectively.

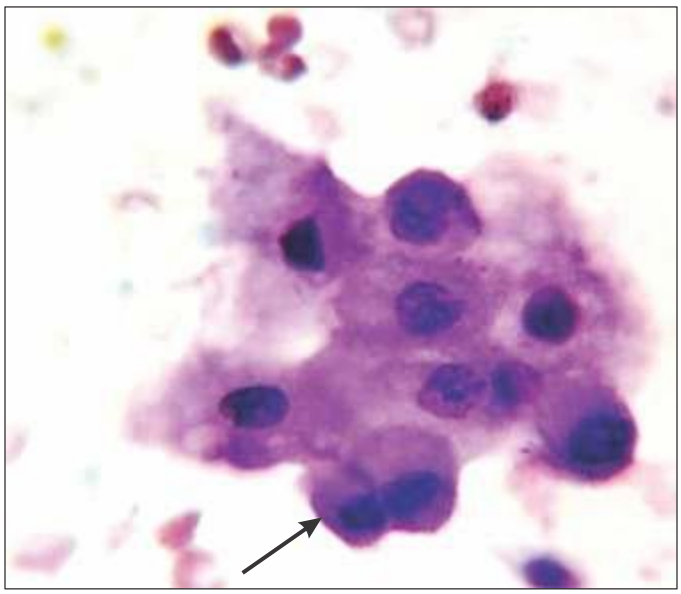


Fig. 3. Giemsa-stained cytosmear at 100X revealed hyperchromatic cells, atypical nuclei, prominent nucleoli and a mitotic figure (black arrow).

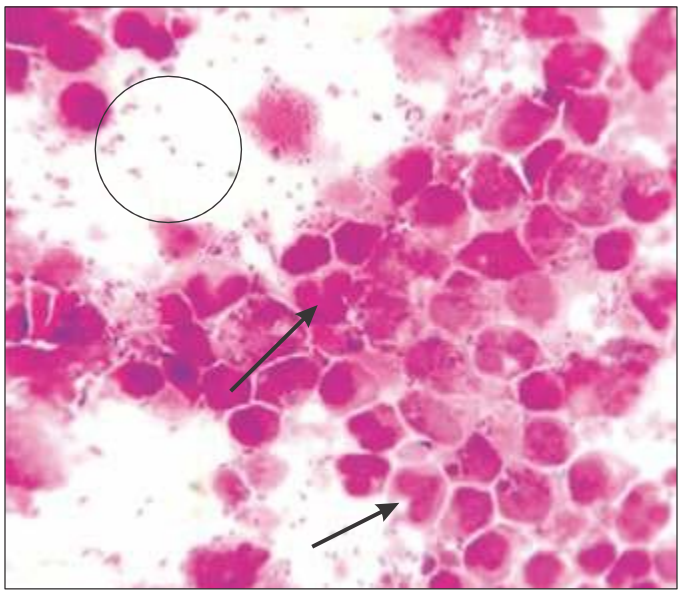


Fig. 4. Giemsa-stained cytosmear at 100X revealed the presence of bacterial colonies (encircled) along with neutrophilicinfiltration (black arrows) and a few atypical cells with nuclear changes

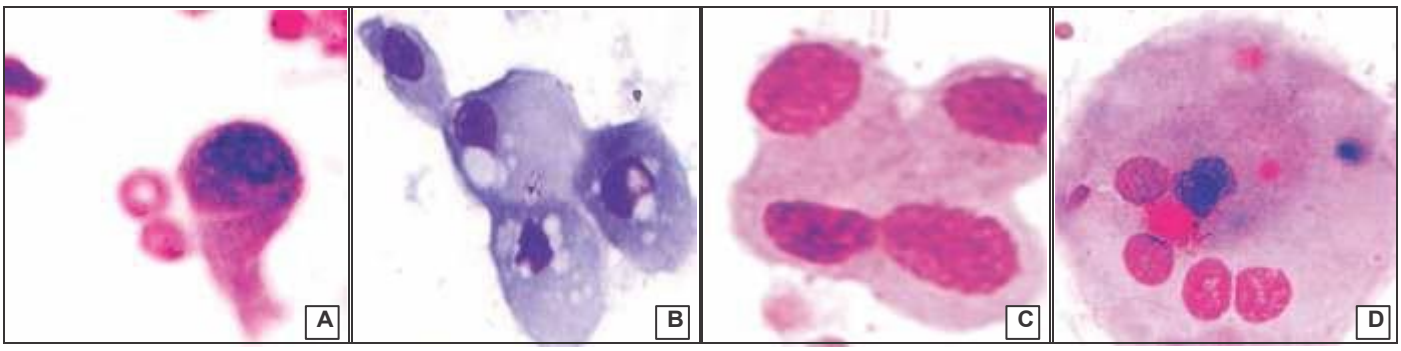


Fig. 5. **(A)** showing cercariform cells (CC cells) with a plumpy body and hyperchromatic nuclei at one end with a non-tapering flattened cytoplasmic process (fishtail appearance). **(B)** showing pearl formation of cells along with vacuolated cytoplasm. **(C)** and **(D)** showing syncytial cell formation and dividing and atypical nuclei with distinct nucleoli. (100 X)

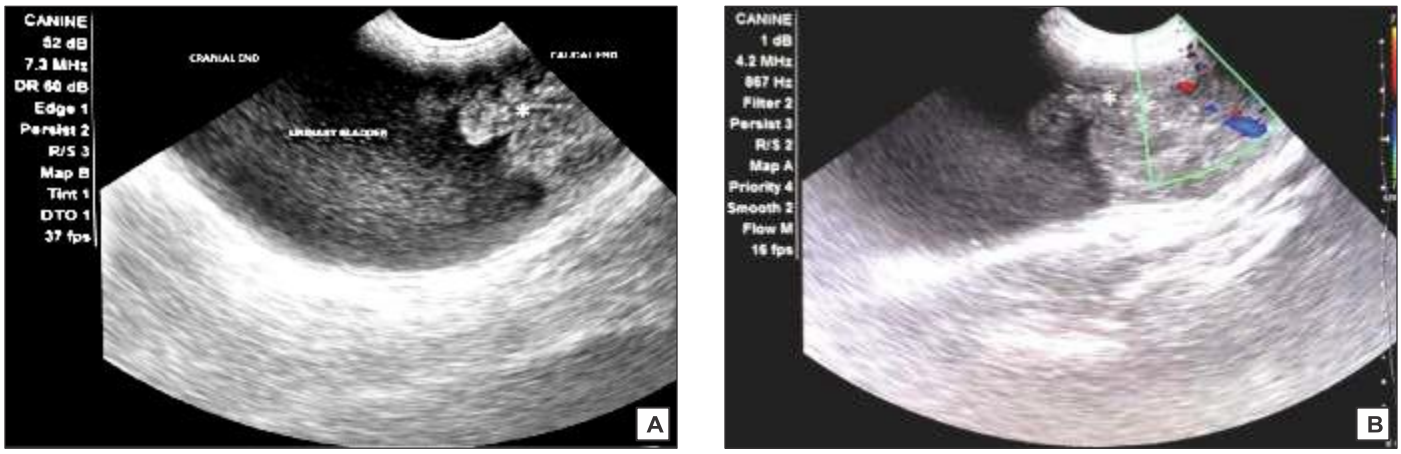


Fig. 6. **(A)** USG findings revealed severely distended urinary bladder with hyper echoic irregular structures seen at the neck (trigone*) of bladder suspected for growth or TCC; **(B)** Colour Doppler mode USG showing increased vascularity of the tumorous growth.

Table 1. Complete blood count of a dog.

Parameters	Result	Reference range
WBC	12.90 × 10^3 /µL	4-12×10^3/µL
Neu%	71.2%	51-72%
Lymph%	25.2%	8-35%
Mon%	3.4%	1-9%
Eos%	0.2%	0-9%
RBC	5.90×10^6/µL	5.7-10.5×10^6/µL
HGB	12.1g/dL	9-16 g/dL
HCT	38.2%	38-52%
PLT	225×10^9/L	160-420×10^9/L

Table 2. Biochemical profile for various tests.

Test	Result	Reference range
Glucose	107.69 mg/dL	76-119 mg/dL
Bilirubin total	0.09 mg/dL	0-0.3 mg/dL
SGOT	29.73 U/L	13-30 U/L
SGPT	23.57 U/L	10-109 U/L
Alkaline Phosphatase	114.27 U/L	1-114 U/L
Total Protein	6.34 g /dL	5.4-7.5 g /dL
BUN	69.68 mg/dL	8-28 mg/dL
Creatinine	2.23 mg/dL	0.5-1.7 mg/dL

shown in Figs. 6A and B, respectively. The trigonal region is the most common site of tumour development as reported by many authors (Knapp *et al.*, 2015; Christopher *et al.*, 2015).

To conclude and summarize, the case presented was diagnosed as Transitional cell carcinoma at the trigonal area of the urinary bladder with the help of direct microscopy of urine, complete blood count, ultrasound examination and cytology. The diagnostic yield of cytology has been seen with a correlation rate of around 20, 61.7 and 92.8% for G1, G2 and G3 TCC, respectively with an average diagnostic yield of 70% (Algaba, 2010). Positive voided urine cytology predicts the presence or eventual occurrence of TCC in advance, so any urine sample voiding any kind of neoplastic cells which gives an impression of transitional cell carcinoma should be handled carefully and owners should be made aware of the future consequences. Moreover, the simplicity of this technique (cytology) and non-invasiveness are very important advantages over other invasive techniques and thus can be life-saving for a patient if used to detect TCC at an early stage thus improving chances of survival. TCC in a dogcan become locally advanced and can also metastasize to other organs therefore, dogs with TCC must undergo staging tests which include haemato-biochemical profiling, urinalysis, cytological examination, radiography and USG imaging to determine the extent of invasiveness of cancer.

REFERENCES

Algaba, F. (2010). Grading of urologic tumors: is it still useful? *Int. J. Surg. Pathol.* **18(3 Suppl)**: 112-117.

Begum, S., Deka, A., Tamuli, S.M., Dutta, B. and Buragohain, M. (2023). Histopathological and cytopathological findings of canine squamous cell carcinoma. *The Haryana Veterinarian* **62(SI-2)**: 162-164.

Christopher, M., Fulkerson, C. and Knapp, D.W. (2015). Management of transitional cell carcinoma of the urinary bladder in dogs. *Vet. J.* **205(3)**: 217-225.

Dey, P., Amir, T., Jogai, S. and Al Jussar, A. (2005). Fine needle aspiration cytology of metastatic transitional cell carcinoma. *Diagn. Cytopathol.* **32(4)**: 226-228.

Glickman, L.T., Raghavan, M., Knapp, D.W., Bonney, P.L. and Dawson, M.H. (2004). Herbicide exposure and the risk of transitional cell carcinoma of the urinary bladder in Scottish Terriers. *J. Am. Vet. Med. Assoc.* **224**: 1290-1297.

Knapp, D.W. and McMillan, S.K. (2013). Tumors of the urinary system, In: Withrow & MacEwen's small animal clinical oncology. (5th Edn.) In S.J. Withrow, D.M. Vail and R.L. Page (Edts.)., St. Louis, MO: Elsevier Saunders. pp. 572-582.

Knapp, D.W., Ramos-Vara, J.A., Moore, G.E., Dhawan, D., Bonney, P.L. and Young, K.E. (2014). Urinary bladder cancer in dogs, a naturally occurring model for cancer biology and drug development. *Inst. Lab. Anim. Res. J.* **55**: 100-118.

Soni, M., Kumar, R., Choudhary, S., Verma, A. and Asrani, R.K. (2023). Clear cell tumor of salivary gland in a dog: A case report. *The Haryana Veterinarian* **62(SI-2)**: 159-161.