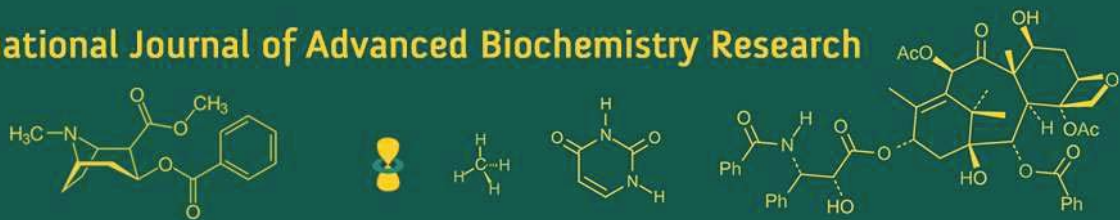


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Diagnosis and surgical management of transitional cell carcinoma in a dog

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Abstract

Transitional cell carcinoma (TCC) is a malignant neoplasm commonly affecting the urinary tract of dogs, presenting significant diagnostic and therapeutic challenges. This case report details the diagnosis and surgical management of TCC in a canine patient presenting with hematuria, dysuria, and urinary incontinence. Diagnostic workup, including imaging studies and cytological evaluation of urine sediment, confirmed the presence of a bladder mass. Surgical intervention involved a cystotomy with complete excision of the tumor followed by adjunctive therapy with non-steroidal anti-inflammatory drugs and chemotherapy. Post-operative monitoring revealed initial clinical improvement, although long-term prognosis remains guarded due to the aggressive nature of TCC. This case underscores the complexities in diagnosing and treating TCC in dogs and emphasizes the importance of multimodal therapy and diligent follow-up in optimizing patient outcomes.

Keywords: Transitional cell carcinoma, dogs, surgical management

Introduction

Transitional cell carcinoma (TCC), also referred to as urothelial carcinoma, is the most common form of urinary bladder cancer in dogs, affecting tens of thousands of dogs worldwide each year (Fulkerson and Knapp, 2015) [2]. The present article reports the successful diagnosis and surgical management of urinary bladder transitional cell carcinoma in dog.

An eight years old male black Labrador dog was brought to the department with history of decreased urine output, painful micturition and red coloured urine since last five days. On clinical examination, physiological parameters were found to be within normal range. On abdominal palpation, animal exhibited signs of discomfort, slight pain, haematuria, stranguria, pollakiuria and viscous urine were seen thereafter. Urine sample was sent for routine urine analysis. Microscopic examination of urine revealed presence of epithelial cell showing hyperchromasia and high nucleus to cytoplasmic ratio (Fig. 1) along with erythrocytes on staining with giemsa stain. Right lateral thoracic and abdominal roentgenogram revealed no metastasis and no abnormality, respectively. Ultrasonography was also performed after clipping the hairs and positioning the dog in dorsal recumbency. Ultrasound evaluation was performed after distension of the urinary bladder with sterile normal saline solution. On ultrasonogram an irregular mass having hypo and hyperechogenicity appeared adjacent to the dorsal wall with thickened wall of the urinary bladder (Fig. 2). Colour Doppler ultrasonogram revealed increased vascularity suggestive of urinary bladder tumour or any soft tissue growth (Fig. 3). Upon haemo-biochemical examination urea nitrogen and serum creatinine levels were found elevated but rest of parameters were within normal range. On the basis of above findings, exploratory cystotomy was decided to be performed. The ventral abdomen caudal to umbilicus was prepared for aseptic surgery as per the standard protocol. A left caudal paramedian incision was made under general anaesthesia to enter into the abdominal cavity after incising the muscles and peritoneum. The bladder was exteriorised through the incision and the abdominal cavity was packed with sterile drapes. Cystotomy was performed to enter into the lumen of the bladder and on examination, mass was found attached to the dorsal wall of the urinary bladder projecting into the lumen (Fig. 4).

This mass was excised carefully along with 1 cm normal margin of urinary bladder. Urinary bladder was catheterised and cystorrhaphy was performed. Peritoneum, muscles and skin were closed in routine manner.

Post-operatively, the dog was administered with Ceftriaxone with Tazobactam (Intacef Tazo) @ 20 mg/kg body weight IM b.d., Analgesic Meloxicam @ 0.2 mg/kg body weight IM o.d. and antacid Ranitidine @ 1 mg/kg body weight IM for three days. Antiseptic dressing of surgical wound was done for 12 days till removal of skin sutures. Three shots of combination of cisplatin @ 50 mg/m² and doxorubicin @ 20 mg/m² were administered slow IV once in three weeks after 4-hour saline diuresis. Chlorpheniramine maleate @ 0.5mg/kg body weight IM and ondansetron @ 0.5mg/kg body weight IV were administered prior to chemotherapeutic agent to compensate adverse effects. Diuresis with normal saline was done after chemotherapeutic agent administration. Dog started passage of normal urine on next day of surgery. Dog recovered uneventfully.

Histological examination of growth sections revealed papillary infiltrating transitional cell carcinoma of urinary bladder characterized by formation of cords of transitional epithelium extended into lamina propria. (Fig 5 A). Malignant cells also formed the papillary projection into lumen of solid cords. (Fig 5 B). Atypical nuclei, bizarre appearance of cells, vacuolation in cytoplasm and focal area showing squamous metaplasia with few mitotic figures were observed (Fig 5 C).

Canine transitional tumour is most likely to be multifactorial. Various risk factors have been identified such as exposure to topical insecticides for flea and tick control, obesity, gender, breed (Scottish Terrier) and exposure to marshes that have been sprayed for mosquito control (Weller *et al.*, 1979; Macy *et al.*, 1983 and Glickman *et al.*, 1989)^[8, 5, 3]. In comparison to chemotherapy alone, surgical excision of tumorous masses in non-trigonal regions before treatment results in a longer survival time. The median survival time for dogs who had a partial cystectomy followed by adjuvant chemotherapy/medical care was between 498 and 772 days. (Marvel *et al.*, 2017; Bradbury *et al.*, 2021)^[6, 1]. A retrospective study of 25 dogs with unresectable urinary bladder carcinoma revealed that dogs who received an anthracycline drug (doxorubicin or mitoxantrone) in addition to a platinum-based (cisplatin or carboplatin) chemotherapy protocol had a higher survival rate than those who received only a platinum compound.

(Rocha *et al.*, 2000)^[7]. Knapp *et al.* (2016)^[4] reported that NSAIDs along with chemotherapeutic agents showed higher response rates and good safety profile.

Thus, it is concluded that early diagnosis and multimodal therapy have significant impact for the successful treatment of transitional cell carcinoma in canine. Urine screening tests may be used for early detection. Combination protocols using surgical resection, chemotherapy and the non-steroidal anti-inflammatory agent show the most promising results.

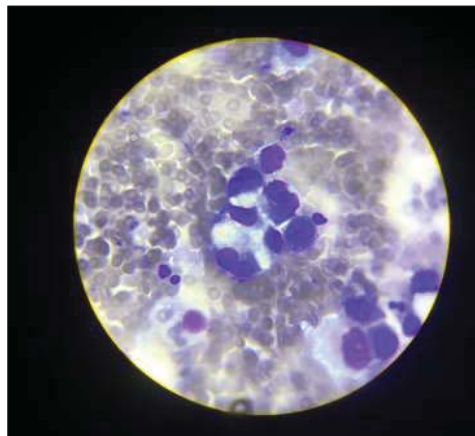


Fig 1: Epithelial cell showing hyperchromasia and high nucleus to cytoplasmic ratio



Fig 2: Ultrasonogram showing mixed echogenic structure with thickened urinary bladder wall

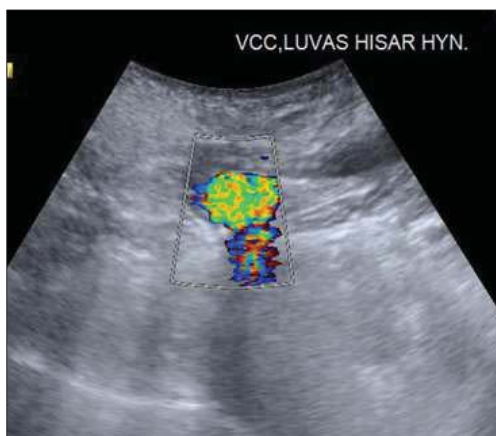


Fig 3: Color doppler ultrasonogram showing vascularity suggestive of urinary bladder tumour



Fig 4: Tumour mass attached to the dorsal wall of the urinary bladder projecting into the lumen.

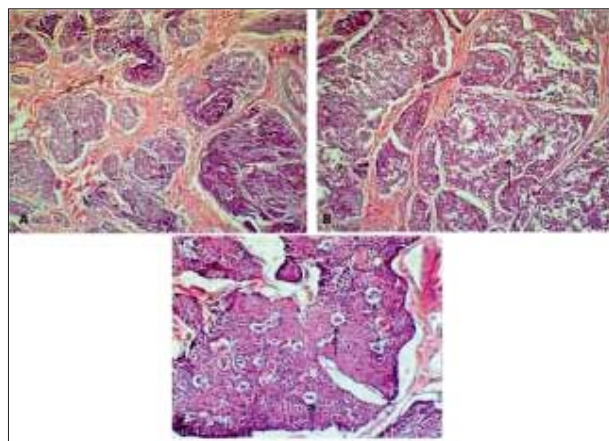


Fig 5: Transitional cell carcinoma of urinary bladder showing A: multiple cords of transitional cells (arrow) surrounded by fibrous stroma (double arrow); B: infiltrating cells forming papillary projection in lumen of cords (arrow) and stroma (double arrow); C: Tumor cells showing bizarre appearance, detachment from basement membrane and vacuolation in cytoplasm H & E stain x100

Conclusion

In conclusion, the successful diagnosis and surgical management of transitional cell carcinoma (TCC) in an eight-year-old male black Labrador dog exemplifies the efficacy of multimodal treatment approaches. The initial presentation with urinary symptoms led to thorough diagnostic evaluations, culminating in an exploratory cystotomy that confirmed and excised the bladder mass. Post-operative care, including antibiotic therapy and chemotherapy, facilitated a smooth recovery with resumed normal urination. Histological examination confirmed TCC, highlighting the importance of early detection and intervention. The combined use of surgery, chemotherapy, and adjunct therapies like NSAIDs appears pivotal in enhancing survival outcomes for dogs afflicted with this challenging malignancy.

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