DIAGNOSIS AND SURGICAL TREATMENT OF A TRANSITIONAL CELL CARCINOMA IN THE BLADDER APEX OF A PET RABBIT (*ORYCTOLAGUS CUNICULUS*)

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Abstract

A 6-year-old, 1.9-kg female spayed lop-eared European rabbit (*Oryctolagus cuniculus*) was evaluated for acute hematuria and inappropriate urination and defecation of less than 12-hours duration. Abdominal ultrasonography revealed a suspected bladder mass. Ultrasound-guided cystocentesis was performed and the results of the urinalysis were unremarkable. An abdominal exploratory surgery revealed a nodular cystic mass at the cranial ventral apex of the bladder wall which measured 0.5 cm × 0.5 cm. Based on histopathologic evaluation, excision of the neoplasm was complete and the mass was diagnosed as transitional cell carcinoma of the bladder. This case suggests that urinary bladder transitional cell carcinoma should be considered in pet rabbits presenting with similar clinical signs. Published by Elsevier Inc.

Key words: hematuria; rabbit; transitional cell carcinoma; *Oryctolagus cuniculus*

Spontaneous neoplasia in the rabbit is frequently seen in a wide range of organ systems; however, neoplasia of the urinary system is a rare occurrence.[1] The most common neoplasia, both in laboratory and pet rabbits, is uterine adenocarcinoma, with a significantly higher incidence diagnosed in does >3-years-old and with a breed predisposition for tan, French silver, Havanna, and Dutch rabbit breeds.[2] Other neoplasms commonly observed in the rabbit, in decreasing order of frequency, include lymphoma, mammary gland tumors, and skin tumors.[3] Tumors of the urinary tract are very rare, with most reports describing tumors of the kidney.[1] Embryonal nephroma is the most commonly documented neoplasia of the urinary tract and has been reported in both *Oryctolagus* spp. and *Sylvilagus* spp.; all reported cases were benign and did not impair renal function.[1,4] Other spontaneous urinary tract neoplasms documented in rabbits include renal carcinoma, renal adenocarcinoma, nephroblastoma, urinary bladder leiomyoma, and kidney hamartoma.[1,3,4] A recent report described both adrenocortical carcinoma and ureteral and renal pelvic transitional cell carcinoma (TCC) in a rabbit displaying signs associated with hypertestosteronemia.[5] To the best of the authors' knowledge, this is the first report of a diagnosis and surgical treatment of bladder TCC in a rabbit.

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CASE REPORT

A 6-year-old, 1.9-kg, female spayed lop-eared European rabbit (*Oryctolagus cuniculus*) presented for acute hematuria and partial vaginal prolapse of <12-hour duration. A 2-week history of inappropriate urination was reported 1-year prior, which according to the owner resolved without medical intervention. Ileus and inappetence of unknown origin were diagnosed 2 months prior to presentation and resolved following treatment based on clinical presenation.

For further clinical assessment, the rabbit was premedicated with butorphanol (1 mg/kg intramuscularly, Torbugesic; Pfizer, New York, NY, USA) and midazolam (1 mg/kg intramuscularly, Versed; Akorn, Lake Forest, IL, USA). The patient was induced and maintained under anesthesia with 2%-3% isoflurane (Isothesia; Henry Schein Animal Health, Dublin, OH, USA) in oxygen using a small facemask. A blood sample was collected from the lateral saphenous vein and submitted for both a complete blood count and plasma biochemistry analysis. Abnormalities noted were increased concentrations of alanine transaminase (117 U/L; reference range: 14 to 80 U/L) and albumin (5.7 g/dL; reference range: 2.5 to 5 g/dL), and decreased concentrations of globulins (0.6 g/dL; reference range: 2.5 to 5 g/dL) and phosphorus (2.0 mg/dL; reference range: 2.3 to 6.9 mg/dL).[6] Whole body radiographic images revealed reduced peritoneal serosal detail secondary to thin body condition or small volume abdominal effusion. Abdominal ultrasonography showed a complexly echogenic, rounded structure with a hypoechoic central area in the urinary bladder measuring 10.3 mm in width (Fig. 1). Initial differential disease diagnoses for the bladder mass were hematoma, neoplasia, or granuloma. Ultrasound-guided cystocentesis was performed and the results of the urinalysis were unremarkable. The remainder of the ultrasonic evaluation of the abdomen, including the liver, was unremarkable. While under anesthesia, the rabbit was administered subcutaneous fluids (35 mL/kg, subcutaneously, once, Lactated ringer solution; Abbott Laboratories, Chicago, IL, USA) and the partial vaginal prolapse was manually replaced using a sterile lubricated cotton-tipped applicator. Following the procedure, flumazenil (0.05 mg/kg intramuscularly, once, Romazicon; Mylan, Rockford, IL, USA) and naloxone (0.05 mg/kg intramuscularly, once, Carpuject; Hospira Inc., Lake Forest, IL, USA) were administered to enhance recovery. With a concern of a possible

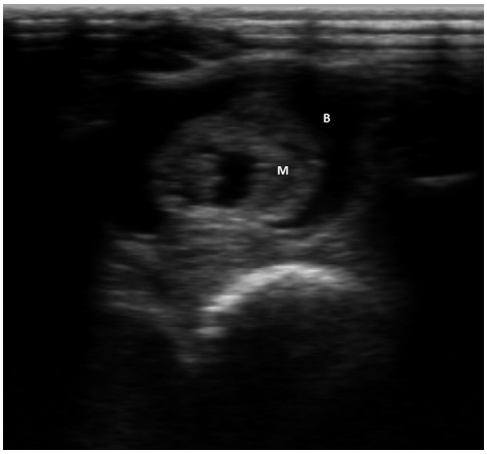

FIGURE 1. Preoperative abdominal ultrasound image of a domestic rabbit showing bladder (B) with 10.3 mm wide rounded mass (M) later diagnosed as transitional cell carcinoma via histopathology.

cystitis, the rabbit was prescribed and released from the hospital with enrofloxacin (20 mg/kg, orally, every 24 hours, for 7 days, Baytril; Bayer Shawnee Mission, KS, USA) and meloxicam (0.5 mg/kg, orally, every 12 hours, for 5 days, Metacam; Boehringer Ingelheim, St. Joseph, MO, USA). Repeated abdominal ultrasonography was recommended within 7 days to reassess the bladder mass.

One week later, the rabbit returned with a 24-hour history of generalized lethargy and inappropriate defecation outside the litter box. Repeated abdominal ultrasonography reconfirmed the presence of the bladder mass. The rabbit was premedicated using midazolam, 1 mg/kg intramuscularly, once, with buprenorphine (0.03 mg/kg, intramuscularly, once, Buprenex; Par Pharmaceuticals, Spring Valley, NY, USA) and ketamine (5 mg/kg, intramuscularly, once, Ketaset; Mylan, Rockford, IL, USA). General anesthesia was induced with 1% to 2% isoflurane in oxygen and a 3.0-mm-sized endotracheal tube was placed endoscopically; anesthesia was then maintained with isoflurane in oxygen. 24 ga intravenous catheters were positioned in both cephalic veins and fluid therapy (10 mL/kg/hour, intravenously, for 2 hours, Lactated ringers solution) with 5% dextrose added was administered by continuous rate infusion using a syringe pump throughout the duration of the procedure. The rabbit was maintained on a heating pad, with heart rate and rhythm monitored using a Doppler ultrasonic flowmeter (Ultrasonic Doppler Flow Detector Model 811; Parks Medical Electronic, Aloha, OR, USA) placed over the sternum and lead III electrocardiogram (Mindray PM 9000 Vet Portable Veterinary Monitor; Mindray Medical USA Corp.,