Transitional cell carcinoma of the urinary bladder in a spectacled bear (*Tremarctos ornatus*)

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A WIDE range of neoplasms has been reported in ursids, with hepatobiliary tumours in Asian bears being among the most predominant (Ramsay 2003). However, a literature search did not yield any published information concerning urinary bladder tumours in bears. Transitional cell bladder tumours have been reported in human beings, domestic dogs, domestic cats and a horse (Osborne and others 1968, Knapp 1995, Patterson-Kane and others 2000). In dogs, cats and human beings, this type of tumour is considered uncommon, comprising less than 2 per cent of reported tumours of all sites (Osborne and others 1968, Helfand and others 1994, Knapp 1995, Mutsaers and others 2003). Risk factors associated with the development of transitional cell carcinomas (TCCs) in human beings include advanced age, being male, smoking and proximity to an urban area (Osborne and others 1968, Knapp and others 2000). Suggested risk factors for domestic dogs include breed disposition, advanced age, female sex, proximity to an urban area and pesticide exposure (Knapp and others 2000, Mutsaers and others 2003). Several theories regarding the reasons for these differences have been proposed, but none has been proved. Risk factors for other species, including bears, have not yet been elucidated. This short communication describes a TCC of the urinary bladder of a spectacled bear (*Tremarctos ornatus*).

A 27-year-old, entire male spectacled bear presented with dark urine and observations by the keeper of possible decreased mobility in the rear limbs. A urine sample collected from the floor immediately following urination was examined by dipstick and cytological evaluation of the urinary sediment, and revealed moderate haematuria and leucocyturia, with intracellular Gram-positive bacteria. The bear was treated with 25 mg/kg cefalexin (Cephalexin; Novopharm) orally twice a day for five days, but the haematuria did not resolve.

Five days after the first urine sample was examined, the bear was anaesthetised with 0·14 mg/kg medetomidine hydrochloride (Domitor 1·0 mg/ml; Orion), 1·4 mg/kg ketamine (Ketaset; Fort Dodge Animal Health) and 1·4 mg/kg tiletamine-zolazepam (Telazol; Fort Dodge Animal Health), all administered intramuscularly. Physical examination of the bear and haematology and blood chemistry were unremarkable. Plain radiographs revealed a possible mass in the urinary bladder, as well as thoracolumbar spondylosis. A double-contrast cystogram was performed to better delineate the bladder mass. An intraluminal space-occupying lesion was noted in the ventral aspect of the bladder. Transabdominal ultrasonography confirmed the presence of a 2·0 x 3·0 x 1·0 cm mass along the ventral abdominal wall of the bladder (Fig 1). The mass was resected with wide margins seven days later.

Histological examination of the mass revealed a multifocally ulcerated, unencapsulated, papillary neoplasm, with deep infiltrative involvement of the bladder wall (Fig 2). The mass was diagnosed as a TCC that appeared to be similar to the malignant, papillary infiltrating type of TCC seen in domestic dogs (Meuten 2002). A fine-needle aspirate of a lumbar lymph node taken at the time of surgery did not reveal neoplastic cells. Thoracic radiographs taken at the same time showed no abnormalities and no evidence of metastasis.

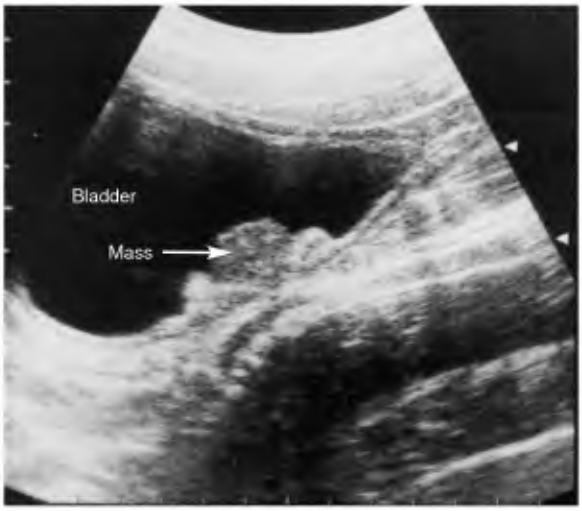

FIG 1: Ultrasonographic image of a mass in the wall of the urinary bladder of a spectacled bear (*Tremarctos ornatus*)

Treatment with 20 mg (0·1 mg/kg) piroxicam (Piroxicam; Mylan Pharmaceuticals) orally once a day was initiated. Since a literature search did not yield a reference for piroxicam in bears, the initial treatment dose was intentionally kept low. When it was clear that the bear tolerated the dose well, the frequency of medication was increased to 20 mg orally twice a day. Although the piroxicam was administered as a treatment for the TCC, it had the side benefit of providing pain relief for the lumbar spondylosis, and within weeks the keepers noted that the bear was moving around much more easily.

The bear was re-anaesthetised five months after the initial diagnosis, using the anaesthetic protocol described earlier. Repeat thoracic radiographs, abdominal radiographs, a double-contrast cystogram and abdominal ultrasonography revealed no evidence of the primary tumour or metastasis, and no change in the vertebral spondylosis. Approximately one year after the initial diagnosis, the bear was euthanased due to severe pain, presumably secondary to the lumbar spondylosis. There was no gross evidence of TCC in the urinary bladder or anywhere else in the body at postmortem examination, but there was histological evidence of metastasis to one lumbar lymph node.

The most common clinical presentation for TCC is persistent haematuria that is unresponsive to antibiotics (Norris and others 1992, Mutsaers and others 2003). Diagnosis is based upon physical examination, cytology of urine sediment, radiography, abdominal ultrasonography, contrast cystography and, in some cases, cystoscopy (Norris and others 1992). Ultrasound-guided fine-needle aspiration of a TCC has been reported to be a successful diagnostic method, but this procedure has been associated with the implantation of neoplastic cells in the ventral abdominal wall in rare cases, and may therefore not be the safest diagnostic technique (Nyland and others 2002). More recently, a less invasive urine dipstick diagnostic test, the bladder tumour-associated antigen test, which was developed for use in human beings, has shown promise as a screening test in domestic dogs (Henry and others 2003).

The bear was treated with piroxicam, a non-steroidal anti-inflammatory drug, which has been shown to have in vitro efficacy against canine transitional cell tumours (Knapp and others 1994, Knapp 1995, Mohammed and others 2002). The mechanism of action of this drug is not clear, but it does not appear to have direct effects on the tumour (Borjesson and others 1999). Instead, piroxicam is thought to exert immunomodulatory effects through the inhibition of prostaglandins

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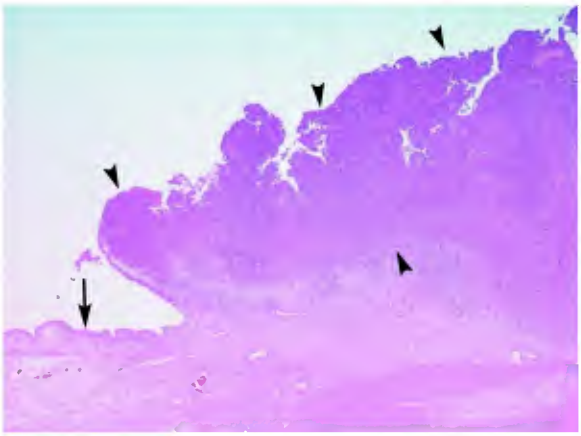

FIG 2: Transitional cell carcinoma of the urinary bladder in a spectacled bear (*Tremorctos ornotus*). The arrow indicates normal epithelium, while the arrowheads outline the tumour as it expands the bladder wall and protrudes into the lumen. Haematoxylin and eosin. x 2

(Knapp and others 1994). Piroxicam has been associated with both renal and gastrointestinal toxicity at higher dosages (1·5 mg/kg), but antitumour activity occurs at lower, less toxic dosages (0·3 mg/kg). Unfortunately, even with treatment, the prognosis for animals diagnosed with TCC is usually poor due to late detection and the tendency for this type of tumour to metastasise (Norris and others 1992, Mutsaers and others 2003). The median survival time of canid patients with TCC following surgical excision alone in several studies was reported to be less than six months (Norris and others 1992, Helfand and others 1994, Mutsaers and others 2003), while the median survival time in dogs that underwent surgical debulking in combination with drug therapy increased to 272 days (Helfand and others 1994, Mutsaers and others 2003). The bear in the present study survived 390 days from the time of diagnosis to euthanasia, which was due to unrelated causes. It is not known whether the piroxicam slowed the progression of disease in the bear, but since no untoward effects were noted, the authors recommend the use of this medication in bears.

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