

RENAL CELL CARCINOMA IN A FEMALE ARABIAN CAMEL

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ABSTRACT

This report describes the clinical, haematobiochemical, ultrasonographical and pathological findings in a female Arabian camel with renal cell carcinoma. The she camel had a history of weight loss, abdominal pain and red urine. Rectal palpation revealed an enlarged mass at the right kidney which distorted its normal conformation. Centrifugation of a urine sample yielded red sediment. Alterations in haematological and biochemical parameters included a decreased hematocrit per cent, red blood cell counts, haemoglobin concentration, total protein, albumin and globulin, and increased glucose, creatinine, sodium and potassium concentrations. Increase in the serum activity of aspartate aminotransferase and creatine kinase were also detected. Ultrasonographically, a caudally protruded, large, irregular shaped, hypochoic and cavitated mass involving the right renal parenchyma was monitored. However, the left kidney subjectively appeared normal. At necropsy, haemorrhagic, irregular shaped and cavitated tumour involving the right kidney was detected. The right kidney was mostly pelvic. Compared to a weight of 1.5 Kg of the left, the right kidney weighed 18 Kg. Histopathologically, renal cell carcinoma showing tubular differentiation with malignant epithelial lining and nuclear anaplasia was suggested. No metastasis was found in other organs.

Key words: Camels, kidney, neoplasia, renal cell carcinoma, ultrasonography

Neoplasm has rarely been reported in camelids. This may be due, in part, to a low prevalence of neoplasia within the population or a lack of presentation for clinical examination (El-Hariri and Deed, 1979; Singh *et al*, 1991; Al-Ani, 2004). Although, relatively few tumours have been reported in camelids, the basic premise is that if a determined search were made through a sufficient population of camelids, neoplasia would be noted in all organ systems (Moulton, 1978; Fowler, 1987). Many necropsies of camelids are conducted by people without specialised training in pathology. This is especially true of neoplasia that may be incidental to the actual cause of death (Fowler, 2010).

Lymphosarcoma is the most commonly reported neoplasm in camelids and has been described in llama, alpacas, and Arabian camels (Fowler *et al*, 1985; Underwood and Bell, 1993; Irwin, 2001; Twomey *et al*, 2008).

Recently, in dromedary camels, case reports of tumours in dromedary camels were reported. It included seminoma and granulosa cell tumour (Ali *et al*, 2013a, 2013b), chondrosarcoma (Janardhan *et al*, 2011), corneal papilloma (Kilic *et al*, 2010), multicentric schwannoma (Khodakaram-Tafi and

Khordadmehr, 2011), osteosarcoma (Tuttle *et al*, 2007), mammary and pulmonary carcinoma (Bryant *et al*, 2007), vertebral osteoma (Carbonell *et al*, 2006) and ovarian teratoma (Mesbah *et al*, 2002). Squamous cell carcinoma has been reported in guanaco, llama and Arabian camel (Altman *et al*, 1974; Cornick 1988; Rogers *et al*, 1997; Tageldin and Omer, 1986). This report describes the clinical, haematobiochemical, ultrasonographical and pathological findings in a female Arabian camel with confirmed renal cell carcinoma.

Materials and Methods

Animal, history and physical examination

A 13-year old female dromedary camel was presented at the Veterinary Teaching Hospital, Qassim University, Saudi Arabia, with a history of weight loss and abdominal pain. Voiding of red urine was reported during the past month. The animal underwent a thorough physical examination which included general behaviour and condition, auscultation of the heart, lungs, rumen and intestine, measurement of heart rate, respiratory rate and rectal temperature, swinging auscultation, percussion auscultation of both sides of the abdomen and rectal examination (Köhler-Rollefson *et al*, 2001).

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Determination of haematological and biochemical parameters

A complete blood count was carried out on the EDTA sample using the VetScan HM5, (Abaxis, California, USA). An automated biochemical analyser VetScan VS2, (Abaxis, California, USA) was used to determine the serum concentrations of total protein, albumin, globulin, glucose, blood urea nitrogen (BUN), creatinine, creatine kinase (CK), aspartate aminotransferase (AST), γ -glutamyl transferase (GGT), total bilirubin, sodium and potassium.

Ultrasonographic examination

The foreleg of the female camel was restrained in. The animal was lightly sedated using intravenous xylazine (0.02 mg/kg 10% Bomazine, Bomac Laboratories Ltd, New Zealand). Both flanks were clipped and the skin shaved. Ultrasonographic examination was carried out using 3.5 MHz sector and 7.5 MHz linear transducers (SSD-500, Aloka, Tokyo, Japan).

After the application of transmission gel to the transducer, the right and left kidneys were examined at the upper right and caudal left paralumbar fossa, 11th ICS and middle left paralumbar fossa. The left kidney was also imaged longitudinally and in a cross-sectional view, and transrectally with the 7.5 MHz linear transducer. Transmission gel was applied to the transducer which was then placed in a plastic rectal glove before being introduced into the rectum. The transducer was placed ventrally, laterally and dorsally to the left kidney (Tharwat *et al*, 2012). Because of the enlargement of the right kidney, it was also possible to scan it transrectally.

Postmortem examination and histopathology

Because of the grave prognosis the female camel was euthanised and postmortem examination was carried out. A tumour specimen was fixed in 10% buffered formalin, processed in wax, sectioned and stained with hematoxylin and eosin for routine histopathology.

Results

The main owner complaint consisted of weight loss and fits of abdominal pain (rolling). A history of haematuria was reported during the last month. Rectal palpation revealed an enlarged mass. Centrifugation of a urine sample yielded red sediment (Fig 1).

Haematological examination revealed hematocrit 21% (reference range 28.9 \pm 2.7 %), RBCs

9.32 \times 10⁶/ μ l (reference range 11.3 \pm 1.4 \times 10⁶/ μ l), haemoglobin 14.2 g/dl (reference range 16.0 \pm 2.3 g/dl), MCV 23 fl (reference range 25.5 \pm 1.5 fl), MCH 15.2 pg (reference range 14.7 \pm 2.4 pg), MCHC 66.3 g/dl (reference range 57.6 \pm 9.0 g/dl), white blood cell count 21970/ μ l (reference range 16.9 \pm 2.7 \times 10⁹/l), neutrophils 19120 / μ l (reference range 9.8 \pm 3.0 \times 10⁹/l), and lymphocytes 2300 / μ l (reference range 5.9 \pm 2.4 \times 10⁹/l).

Blood chemistry panel showed total protein 6.3 g/dl, albumin 3.4 g/dl, globulin 2.9 g/dl, glucose 182 mg/dl, BUN 13 mg/dl, creatinine 1.9 mg/dl, CK 252 U/l, calcium 9.4 mg/dl (reference range 8.6 \pm 0.7 mg/dl), AST 103 U/l, GGT 10 U/l, total bilirubin 0.4 mg/dl, sodium 136 mmol/l and potassium 4.3 mmol/l.

Transrectal ultrasonography revealed a caudally protruded, large, irregular shaped, hypoechoic and cavitated mass involving the right renal parenchyma. However, the left kidney subjectively appeared normal (Fig 2) as previously reported (Tharwat *et al*, 2012).

Necropsy findings revealed the presence of a haemorrhagic, irregular shaped and cavitated tumour involving the right kidney. The right kidney occupied mostly the pelvic cavity. Compared to a weight of 1.5 Kg of the left kidney, the right weighed 18 Kg (Fig 3).

Histopathological examination of the renal specimen revealed renal cell carcinoma showing tubular differentiation with malignant epithelial lining and nuclear anaplasia (Fig 4). No metastasis was found in other organs or even in the left kidney.

Discussion

In this report, the tumour mass involving the right kidney was detected incidentally during transrectal ultrasonography of a female camel with red urine. It was confirmed histopathologically to be renal cell carcinoma. Only another case of renal cell carcinoma was reported in the veterinary literature (Vitovec, 1982). It was identified in a dromedary camel slaughtered at the Mogadishu abattoir, Somalia. Grossly, the renal carcinoma was a large, ovoid, 21 \times 12 \times 12-cm expansive mass occupying most of the right caudal pole of the right kidney. The tumour was light brown on the cut surface and had a pseudolobular arrangement. This neoplasm was the only tumour found in about 13,000 camels slaughtered in the abattoir (Vitovec, 1982).

Renal carcinoma, also known as renal cell carcinoma or renal adenocarcinoma, is the most common form of renal neoplasia in humans and accounts for approximately 3% of all malignant



Fig 1. A female camel with renal cell carcinoma of the right kidney. Left image shows voiding of red urine. Middle image shows haematuria that yielded red sediment after centrifugation (right image).

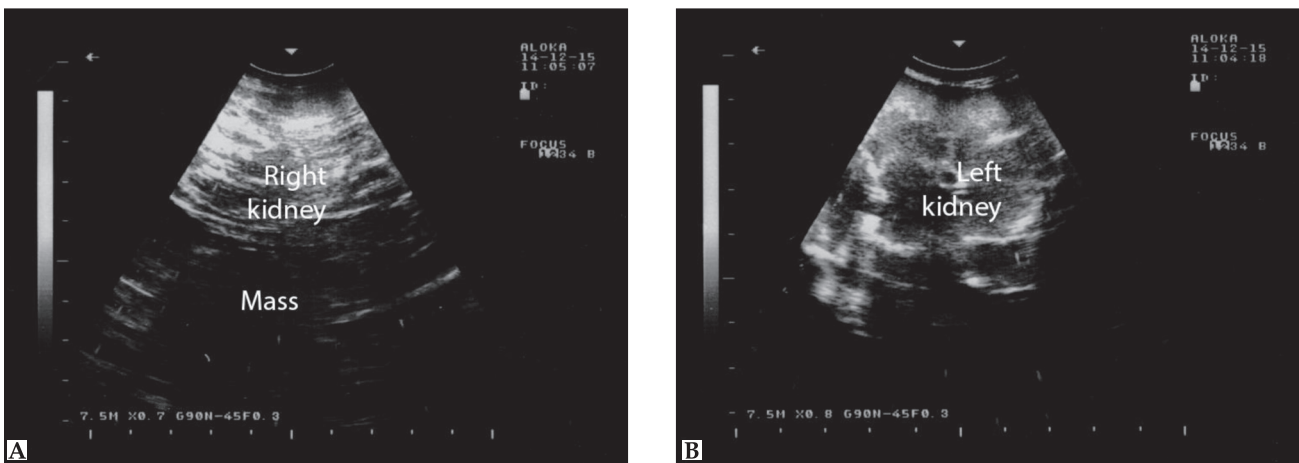


Fig 2. Transrectal ultrasonographic findings in a female camel with renal cell carcinoma of the right kidney. Image A shows a hypoechoic mass involving the right renal parenchyma while the image B shows the normal left kidney.

neoplasms in human adults (Young *et al*, 2006). In humans, the tumours often are discovered incidentally and, if diagnosed early, treatment by full or partial nephrectomy combined with immunotherapy can result in long-term survival (Flanigan, 2007). As in humans, renal carcinoma is the most common form of primary upper urinary tract neoplasia in dogs and horses (Traub-Dargatz, 1998; Bryan *et al*, 2006). Primary urinary tract neoplasia is rare in horses. In a survey of 3,633 horses examined by necropsy in New York State from 1953 to 1976, only 4 cases of renal neoplasia were identified yielding an incidence of 0.11% (Haschek *et al*, 1981).

In the present case, clinical signs included weight loss, abdominal pain and additionally red

urine during the last month. These findings correlate well with findings of Wise *et al* (2009) in horses. This clinical course correlates with what is described in human medicine in that clinical signs of abdominal pain and haematuria or detection of an abdominal mass are not recognised until very late in the course of disease. Approximately 50% of renal neoplasms in humans are incidental findings discovered while imaging the abdomen (Flanigan, 2007). The blood picture and serum chemistry panel in the preset case provided little aid in obtaining a diagnosis of renal carcinoma. Our results agree with Wise *et al* (2009) in horses. On the contrary, transrectal ultrasound examination was helpful in providing information on the extent of the tumour and involvement of

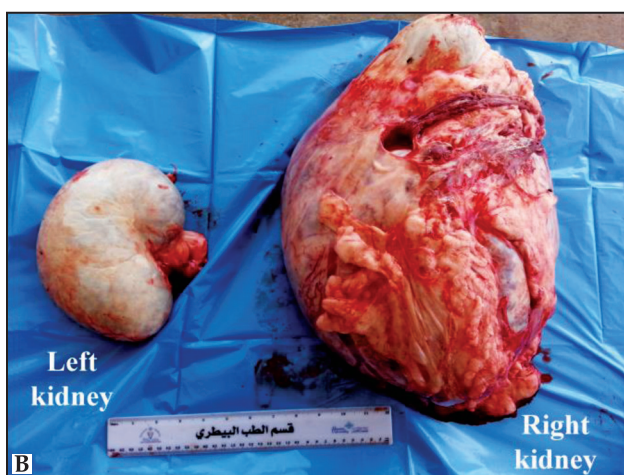
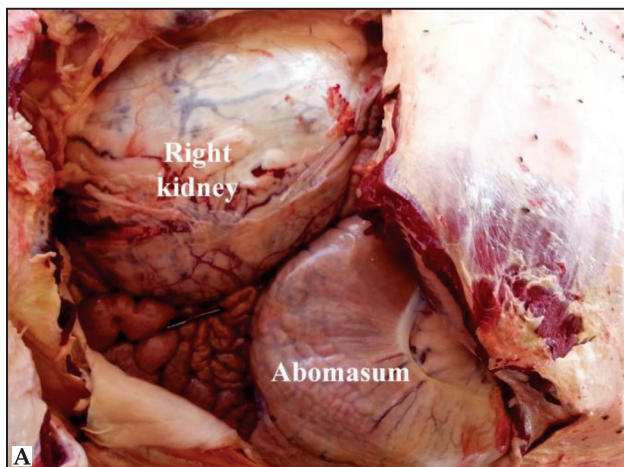


Fig 3. Postmortem findings in a female camel with tumour of the right kidney. Image A, shows that the right kidney with tumour occluding the pelvic cavity. Image B, shows 18 Kg right kidney compared to 1.5 Kg left kidney. Image C, shows cross section through the right kidney large, haemorrhagic, irregular shaped and cavitated tumour.

surrounding structures. Renal ultrasound examination is therefore, the most rewarding imaging procedure.

In this report, it was interesting to find the tumour mass involving the right kidney as Vitovec

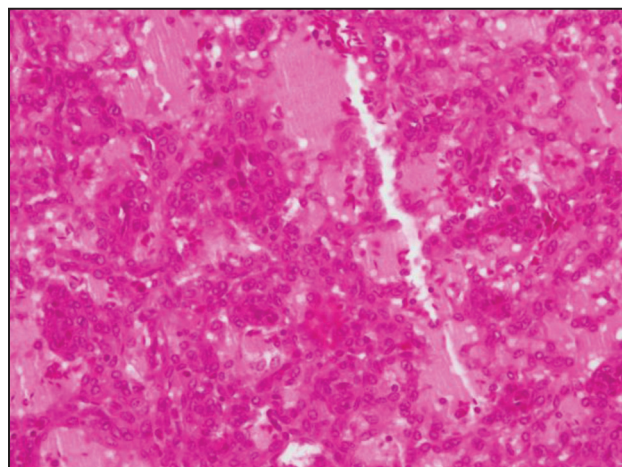


Fig 4. Renal cell carcinoma showing tubular differentiation with malignant epithelial lining and nuclear anaplasia (HE×400).

(1982) found in another camel. Wise *et al* (2009) reported that the primary renal carcinomas are most commonly unilateral and exhibit locally aggressive behaviour and metastasis. In the present case, the tumour mass was found also unilateral, however, no metastasis was found in other organs. In conclusion, the she camel presented for renal carcinoma exhibited nonspecific signs except haematuria in the late stage of the disease process. Laboratory findings were nonspecific, probably because the neoplasia was unilateral. Preliminary clinical diagnosis most often is based upon rectal examination and abdominal ultrasound examination. Histopathological examination of a tumour specimen remains the confirmatory diagnosis.

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News

MARWAR CAMEL CULTURE FESTIVAL FROM 3-5 NOVEMBER 2017

Marwar Camel Culture Festival will be organised from 3-5 November 2017 at LPPS campus, Sadri, Pali District, Rajasthan, India. It will have a variety of programmes, i.e. All-Rajasthan Camel Breeders' Meeting and Debate with Policy Makers, Visits to Nomadic Raika Camel Herds with Camel Milk Tea, Camel Cheese and Pastries with Anne Bruntse and Robert Paget, Camel Milk and Autism, Workshop with Christina Adams and Camel Milk Competition. There will be a brain storming session on the topic "What kind of Camel Science do we need?". There will be eminent penalist for this discussion. Festival will have the attractions like Rooftop Camel Café, Camel Film Festival with Clara Wieck, Doug Baum and others, Full Moon Concert of Camel Songs and Sufi Music with Rajasthani Musicians and Camel Craft Bazaar with potters from Molela, weavers, camel poo paper.

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