N15

Tubulo-papillary renal cell carcinoma in a captive ocelot (*Leopardus pardalis*)

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Abstract

A 12 years old captive ocelot (*Leopardus pardalis*) was diagnosed with a 2.6x2.2x1.6 cms mass on the cranial pole of the right kidney. No other macroscopic changes were observed during necropsy. The mass was processed by standard Hematoxilin & Eosin staining. Periodic Acid-Schiff (PAS)staining was also performed. The tissue was analyzed for the following markers by immunohistochemistry: WT1, CK Ae1/A3, CK19, CK 7, Vimentin , Melan-1, and HMB45. Only vimentin had a positive stain. Under microscopic examination, the mass was surrounded by a fibrous pseudocapsule and compressed the adjacent normal renal. The tumoral cells are small cuboidal epithelial cells arranged in a single layer. The tissue cells have lightly eosinophilic cytoplasm, a rounded nucleus, and no mitoses. The epithelial cells grow in a papillary pattern which contains pseudo-rosettes in their lumen. Some of these pseudo-rosettes contain a PAS positive material, most likely Tamm-Horsfall protein. The stroma was also PAS-positive. The number of pseudorosettes varies from one to several in each tubule. Based on this finding, the tumor was classified as a tubulo-papillary renal cell carcinoma. Although this neoplasia is well described in domestic cats, it is rarely reported in wild felids. To our best knowledge, this is the first renal carcinoma reported in the Pardalis genera, which includes 13 new world felids. Its occurrence in an Ocelot is valuable since neoplasias in this specie are rarely reported in Latin America.

Introduction

Wildlife neoplasia is still a developing field due to the difficulty of evaluating this disease in free-ranging populations. There are only some well-described tumor types in wildlife populations. Tasmanian facial tumor disease and Poliomavirus causing Neuroglial tumors in raccoons are two examples of tumors with conservational repercussions. Besides these two examples, neoplasia is rarely a conservation threat to wildlife, and their understatement and management still need to be more developed for a correct approach to these diseases. Several reports of neoplasia in captive felids, especially in the *Panthera* genus, *Panthera leo,* and *Panthera tigris, are* two of the most studied ones. The reports available for neoplasia in neotropical cats are fewer.
Nonetheless, *Leopardus pardalis* is one of the species with more neoplasia reports. These include Pulmonary adenocarcinoma, transitional cell carcinoma, and hepatocellular carcinoma. To our knowledge, renal carcinomas are not yet reported in this species.

Materials and Methods

Table 1. Immunohistochemistry markers used.

Target Antigen	Positivity	Host	Antigen retrieval	Chromogen
Vimentin	+++	Mouse	ER1	DAB
CK Ae1/A3	-	Mouse	Proteinase K	DAB
CK 7	-	Mouse	ER1	DAB
Melan A	-	Mouse	ER2	DAB
HMB45	-	Mouse	Proteinase K	DAB
WT1	-	Mouse	Proteinase K	DAB

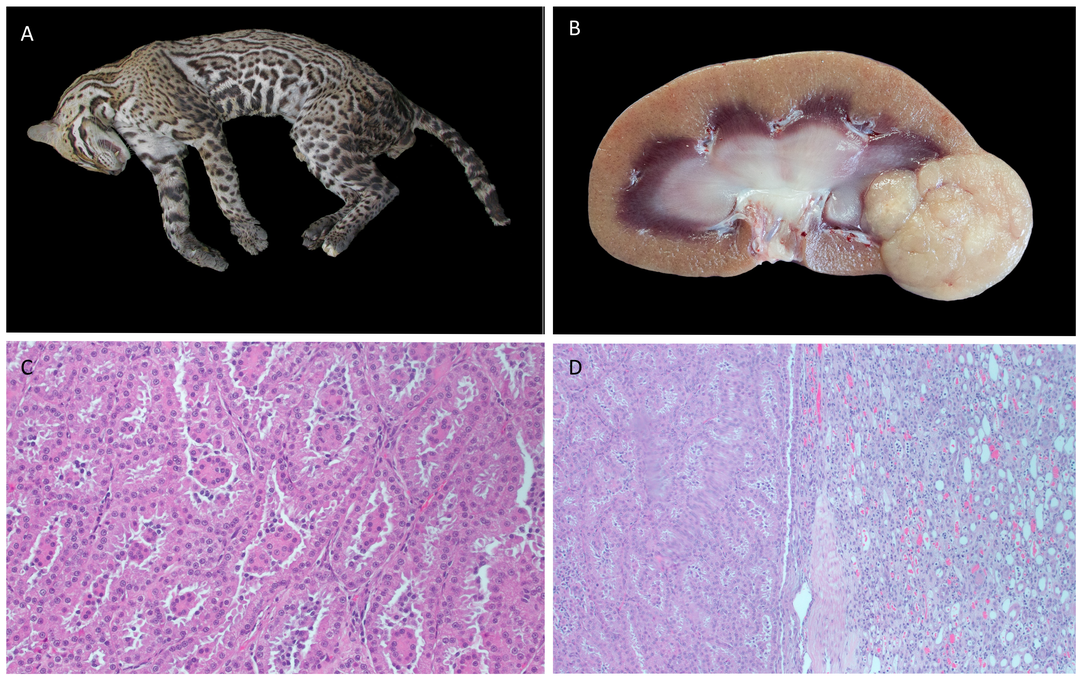

Figure 1. A. Male ocelot before necropsy procedure. **B**. Gross appearance of the cross-section old renal mass, right kidney. **C**. Microphotography of the mass. 20x. H&E stain. **D**. Microphotography showing the pseudorosettes located inside the tubules. 40x H&E Stain.

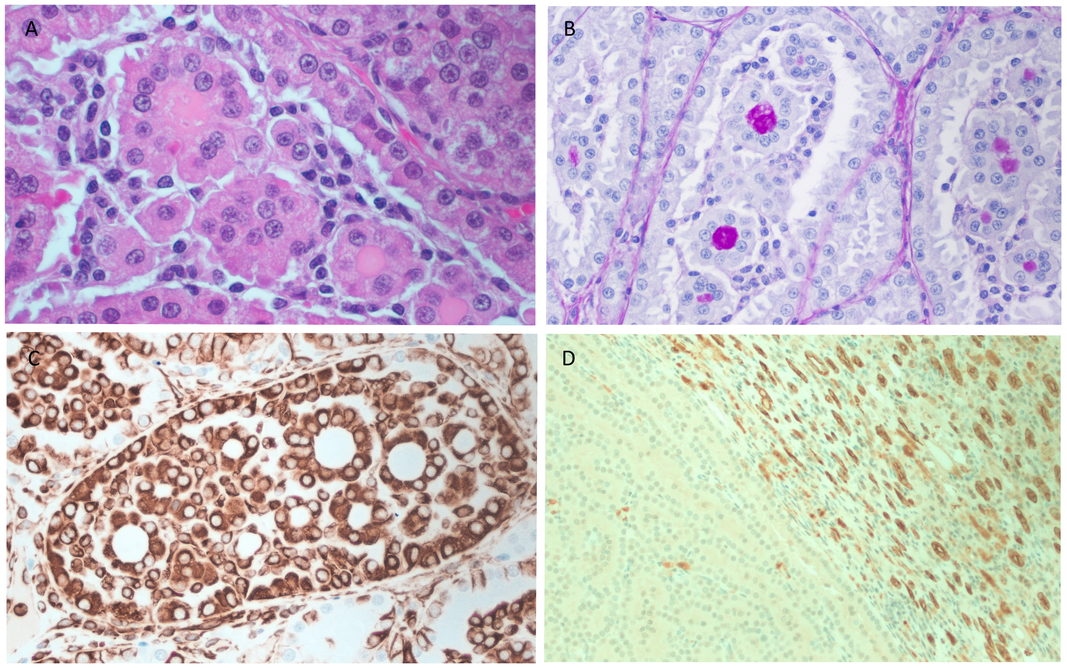

Figure 2 A. Microphotography of the neoplastic-normal renal tissue showing the pseudocapsule 4x. H&E staining. **B.** Immunohistochemistry. Vimentin-positive cells with positive cytoplasmatic staining. 40x tubule. **C.** Negative immunohistochemistry of AE1/AE3 pan-cytokeratin. On the left side, neoplastic tissue, and on the right side, positive distal tubes. **D**. PAS-positive material continues in the pseudorosettes.

Materials and Methods

A 12 years old captive ocelot was diagnosed by ultrasound with a renal mass on the cranial pole of the right kidney. Fine needle aspiration shows naked nuclei, and pseudorosettes conformed of 7-8 cells with a single nucleolus, eosinophilic nucleus, and vacuolated cytoplasm. The animal was part of the Costa Rica Rescue Center exhibit collection. The animal was euthanized by the veterinary staff using pentobarbital (Euthanex©)
The renal mass measured 2.6x2.2x1.6 cms. (Figure 1B) It had a firm consistency with white-yellow color. No evident hemorrhage or necrotic tissue was evident grossly. The kidney was placed in 10% buffered formalin. The sample was processed for routine H&E staining. The Periodic Acid-Shiff stain was also performed. The tissue was stained for several immunohistochemistry markers (Table 1)

Results

The mass was composed of well-differentiated tubules (Figure 1C) in a single layer of cubic epithelium surrounded by a fibrous pseudocapsule (Figure 1D). Some tubules contained pseudorosettes filled with eosinophilic material (Figure 2A). The number of pseudorosettes inside the tubules ranges from 0 to 3. Mitotic figures were <1 per 4x field. The PAS marked the basement membrane, therefore confirming an epithelial origin. PAS-positive material inside the tubules, most likely Tamm-Horsfall protein (Uromodulin) (Figure 2D).
Vimentin was the only IHC marker with a positive stain (Figure 2C). Although Vimentin is a positive marker for mesenchymal tumors, other tumors of epithelial origin can stain positively. Regarding the negative cytokeratins Ae1/A3 stain, this marker only stains distal renal tubes (Figure 2D). Therefore, this neoplasia most likely originated from the proximal tube. WT1 staining had a negative stain. This marker was used to discard nephroblastoma (Wilm's tumor). Recently, the molecular description of Translocation carcinoma in humans has improved. Some of these tumors are known to have pseudorosettes containing tubules and are positive for HMB245 and Melan-1 antigens. Nonetheless, both markers result negative for this case. A renal adenoma is another differential diagnosis based on the tissue architecture, well-differentiated cells, tumor size, and size. This tumor is usually less than 2cm in size in dogs and cats. Although a species-specific cutting point is needed, we apply this criterion to this case.

Conclusions

Reports of these cases are needed for a better understanding of captive wildlife neoplasias. Standardization of size and growth pattern, mitotic count, and immunohistochemistry markers are necessary for a correct neoplasia classification in wild species. Well-differentiated renal carcinomas can be difficult to differentiate from a renal adenomas; therefore, renal adenoma must be considered as a differential diagnosis for this case.