Case Report

Urinary Bladder Rhabdomyosarcoma (Botryoid Rhabdomyosarcoma) in a Labrador Retriever Dog

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Abstract: Urinary bladder rhabdomyosarcoma from a 9-month-old female Labrador retriever dog is described. Grossly reddish black multiple friable multinodular masses filled the lumen of the urinary bladder. Histologically, the masses consisted of round, fusiform and polygonal cells with various consistencies. There were also some strap-like cells with chained nuclei and cross-striations. It was diagnosed as a urinary bladder rhabdomyosarcoma. Additionally, the diagnosis was confirmed by immunoreactivity of tumor cells for canine myoglobin.

Key words: botryoid rhabdomyosarcoma, urinary bladder, dog

Whilst rhabdomyosarcoma of the urinary bladder is rare, it has been rather commonly reported in literatures probably because of the characteristic nature of the tumor¹². In dogs, a variant is distinguished as botryoid rhabdomyosarcoma¹² or embryonal rhabdomyosarcoma of the urinary bladder¹. It constitutes a distinct entity, and accounts for the majority of reported rhabdomyosarcomas in dogs³.

Cross-striation and immunohistochemical positiveness for myoglobin are the principal histopathological criteria for the diagnosis of rhabdomyosarcoma¹². However, in canine botryoid rhabdomyosarcomas, cross-striations are rarely found³ or can be found in only around half of the cases observed³⁴. Myoglobin is a specific marker for cells derived from striated muscle, but not all rhabdomyosarcomas have recognizable amounts of myoglobin¹⁵. Myoglobin is expressed later than desmin on the differentiation process, and poorly differentiated rhabdomyosarcomas may express desmin but lack myoglobin¹. We found a rhabdomyosarcoma in the urinary bladder of a young female dog, which had easily recognizable cross-striations and canine myoglobin expression in tumor cells.

A 9-month-old female Labrador retriever dog was presented to a private veterinary hospital, displaying symptoms of pollakiuria, anorexia, and loss of activity. Eleven days after the first presentation, difficulty in urination was apparent and the dog was hospitalized. At this stage, hematological examination and urinalysis revealed deteriorated urinary function. The clouded urine showed strongly positive occult blood reaction and the urine sediment included erythrocytes, leukocytes and epithelial cells without atypia. An abdominal ultrasonography revealed the bladder masses. The excision of bladder masses by electrocautery was performed, but euthanasia was elected at the request of the owner due to the poor prognosis. Necropsy could not be conducted.

Grossly, the urinary bladder showed no significant changes on the serosal surface except for a slight dilatation of the left ureter. On opening the bladder, the tumor masses were found to arise mostly from the trigone and some from the body as polypoid (grape-like) masses, protruding into the lumen of the urinary bladder and occupying the lumen (Fig. 1). They were of various sizes and reddish black multiple nodular masses with rather translucent cut surface.

The excised urinary bladder and tumor masses were fixed in 10% formalin and submitted to the Department of Pathology at Azabu University Veterinary Teaching Hospital. They were processed routinely, embedded in paraffin, sectioned at 4 µm and stained with hematoxylin and eosin (HE). Selected sections were also stained immunohistochemically. For immunohistochemistry, anti-vimentin (1:50, monoclonal, Nichirei, Tokyo, Japan), anti-desmin (1:200, monoclonal, Nichirei, Tokyo, Japan), anti-human alpha-smooth muscle actin (prediluted, monoclonal, Nichirei, Tokyo, Japan) and goat anti-dog myoglobin (1:400, polyclonal, Bethyl Laboratories, Montgomery, TX, U.S.A.)
were used. Microscopically, the tumor masses occupied the full thickness of lamina propria and submucosa with slight focal extension into the underlying bladder muscle. The overlying epithelial layer was partly ulcerated and covered with crust layer, but the tumor cells did not invade into the remaining intact transitional epithelium. The masses consisted of a mixture of edematous or myomatous areas and more cellular areas of spindle and pleomorphic cells, scattered through which were some strap-like rhabdomyoblasts or myotubes with chained nuclei and recognizable cross-striations (Figs. 2 and 3). There was also a compact lamellar cell aggregation immediately beneath the intact mucosa similar to cambium layer focally (Fig. 4).

Immunohistochemically, most tumor cells expressed vimentin and desmin in the cytoplasm. Some cells, especially the cells with cross-striations were also positive for myoglobin in their cytoplasm (Fig. 5). All neoplastic cells were negative for alpha-smooth muscle actin.

Our present case was diagnosed as a urinary bladder rhabdomyosarcoma based on the recognition of cross-striations in HE sections. Additionally, this diagnosis was confirmed by immunoreactivity for canine myoglobin.

Tumors of the urinary bladder and urethra account for about 0.5–1.0% of all canine neoplasms\(^2,4\). Only 10% of bladder neoplasms are of mesenchymal origin\(^2\), and smooth muscle tumor is the most common primary mesenchymal bladder neoplasm observed in dogs\(^2\). Rhabdomyosarcoma accounts for about 1.0% of canine primary urinary bladder tumors, which occur in young dogs (less than 2 years of age), at a ratio of 2:1 females to males and may be a predisposing factor in some large breeds\(^2\).

There are two representative classification schemes for rhabdomyosarcoma in domestic animals. According to the Histological Classification of Tumors of the Mesenchymal Tumors of Skin and Soft Tissues of Domestic Animals, malignant tumors of the striated muscles are classified into two types: rhabdomyosarcoma and embryonal rhabdomyosarcoma of the urinary bladder\(^1\). According to the Tumors in Domestic Animals, malignant tumors of the striated muscles (rhabdomyosarcoma) are classified into embryonal, botryoid, alveolar and pleomorphic rhabdomyosarcoma\(^1\). In the latter classification, based on the human pathology, when an embryonal rhabdomyosarcoma develops from the mesenchyme of mucinous membrane lining cavities and hollow viscera, the tumor assumes a typical grape-like configuration known as botryoid rhabdomyosarcoma\(^1\).

According to the international classification of rhabdomyosarcoma in human beings, the densely cellular “cambium layer (of Nicholson)” immediately beneath the mucosa is an important diagnostic criterion for botryoid rhabdomyosarcoma\(^5\). As for the canine botryoid rhabdomyosarcoma, more compact cell arrangements, often at the periphery, are described as a reminiscent of the cambium layer\(^1\). We observed a focal compact cell layer in loose cell arrangements, similar to cambium layer just beneath the intact mucosa. It may also be a pathognomonic
finding in canine botryoid rhabdomyosarcoma.

In human pathology, myoglobin, although a specific marker of skeletal tumors, is not particularly sensitive. It is detected in 30% (6/20) of cases in the embryonic subtype. In canine cases, little information is available on statistical data of myoglobin expression in rhabdomyosarcomas, although it may be similar to that of human counterparts. In the dog, cross-striations are rarely found or can be found in about half of the cases. Although pathognomonic, cross-striation is rarely found in rhabdomyosarcoma, despite staining with PTAH or iron hematoxylin. There may be a significant relationship between cross-striation and myoglobin expression, because the positive myoglobin staining tends to be restricted to the more differentiated cells.

Using the antibody against dog myoglobin is likely to give a more accurate diagnosis in canine rhabdomyosarcoma. The rabbit polyclonal antibody against human myoglobin has been proved to be a diagnostic aid for identification of rodent rhabdomyosarcomas, although the antigenicity of rodent myoglobin is not the same as that of human myoglobin, and the situation is the same in domestic animals.

The human histologic classification of rhabdomyosarcoma is based on the clinical and pathological features. There are prognostic differences among the histologic subtypes. The prognosis of botryoid rhabdomyosarcoma in humans is generally excellent in the World Health Organization (WHO) Classification of Soft Tissue Tumours in 1994, although, at present, there is insufficient information on clinical outcome in canine botryoid rhabdomyosarcoma. Our present case also do not add any information on prognosis.

In the literature, Willis (1948) proposed the hypothesis for the histogenesis of rhabdomyomatous tumors, including the bladder. Rhabdomyosarcoma of the urinary bladder presumably originates from the rest of embryonic myoblasts in developing Müllerian or Wolffian ducts, but this is still uncertain.

Acknowledgements: The authors would like to thank Mr. Jonathan Lynch (Office of International Communication, College of Environmental Health, Azabu University) for his assistance with proof-reading the English translation of this paper.

References