

Urinary Bladder Rhabdomyosarcoma (Sarcoma Botryoides) in a Young Newfoundland Dog

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ABSTRACT. A 13-month-old female Newfoundland dog suffered from urinary bladder tumor. Histologically the tumor consisted of round or fusiform cells, occasionally having eosinophilic cytoplasm. Apparent mature rhabdomyoblasts possessing elongated eosinophilic cytoplasm and cross striations were infrequently observed. The tumor cells exhibited immuno-positive for anti-myoglobin, desmin and vimentin antibodies. Ultrastructurally, tumor cells have abundant myofibrils in their cytoplasm and Z bands were also detected. The present tumor was diagnosed as a urinary bladder rhabdomyosarcoma in a Newfoundland dog, which has not been frequently reported in dogs. — **KEY WORDS:** canine, rhabdomyosarcoma, urinary bladder.

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Mesenchymal tumors account for about 20% of all primary urinary bladder tumors in domestic animals [6]. Only a few canine cases have been reported as rhabdomyosarcomas [1, 4, 7–9]; these tumors have been speculated to arise in the urinary bladder or urethra, and often showed botryoid appearance, being referred to as “sarcoma botryoides” [1–3, 8]. The most of bladder rhabdomyosarcomas tend to develop in young dogs less than 18 months old [5, 9]. Likewise, in humans, this type of tumor commonly occurs in children under 10 years of age [2, 3]. These findings indicate the juvenile predisposition. Because of the youthfulness of the diseased animals, thus, it has been speculated that the bladder rhabdomyosarcomas arise in the rests of embryonic myoblasts [5, 9]. This paper describes light/electron microscopical and immuno-histochemical findings on a canine rhabdomyosarcoma arising in the bladder.

A 13-month-old female Newfoundland dog was presented to a private veterinary hospital because of hematuria and difficulty in urination. The bladder masses were detected from the radiography and ultrasonography. Thus, the patient was referred to the Veterinary Teaching Hospital of Osaka Prefecture University in order to remove the bladder masses. At the surgery, a mass, 1 cm in diameter, was found on the dorsal serosa of the bladder. After incision of the bladder, multilobulated nodules occupying 4 × 4 cm area were observed in the mucosa of the bladder cervix. An another mass measuring 1 × 0.5 × 0.5 cm was also found at the apex of the bladder. Grossly, the multilobulated nodules exhibited yellowish gray in color and hemorrhagic areas were given grape-like appearance (Fig. 1). The dog died at 3 months after the operation. Necropsy could not be conducted.

The removed tumors were fixed in 10% neutral buffered formalin and embedded in paraffin. Sections for histopathology were cut at 4 μm in thickness and stained with hematoxylin and eosin (HE). Selected sections were also stained by phosphotungstic acid hematoxylin stain

(PTAH) for cross-striations. Immunohistochemistry was carried out by means of the avidin-biotin peroxidase technique (Dako kit, U.S.A.) with the following primary antibodies: rabbit polyclonal antibodies against human myoglobin (Dako, Denmark, 1:400) and cow keratin (Dako, Denmark, 1:400), and mouse monoclonal antibodies against desmin (Dako, Denmark, 1:400), vimentin (Dako, Denmark, 1:400) and α-smooth muscle actin (Dako, Denmark, 1:400). For electron microscopy, formalin-fixed samples were cut into 1 mm cubes, post-fixed in osmium tetroxide, and embedded in epoxy resin. Ultrathin sections were double-stained with uranyl acetate and lead citrate, and examined by a transmission electron microscope (Hitachi H-600, Japan).

Histologically, the tumor developed in the submucosa and smooth muscle layer of the urinary bladder, having various areas in cellularity. The tumor consisted of round or elongated cells with scanty or moderate cytoplasm, and occasional strap-shaped and multinucleated cells (Fig. 2).



Fig. 1. Gross appearance of the bladder rhabdomyosarcoma. Various sized nodules are observed in the bladder mucosa, showing grape-like (botryoid) appearance.

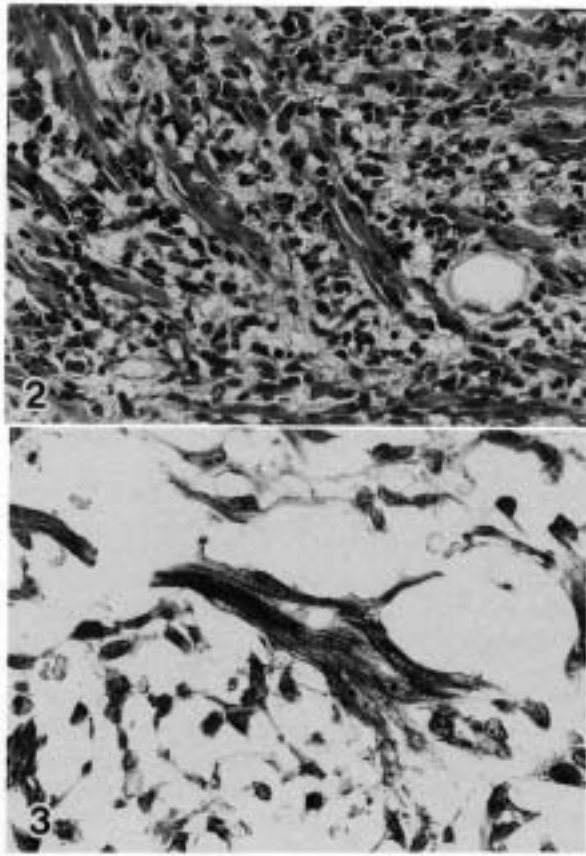


Fig. 2. Histopathology of the bladder tumor. Neoplastic proliferation of round or fusiform cells and elongated rhabdomyoblasts are observed. HE. $\times 280$.

Fig. 3. Cross striations are noted in the neoplastic rhabdomyoblasts. PTAH stain. $\times 560$.

Elongated or multinucleated cells with abundant, filamentous cytoplasm and distinct cross-striations were characteristically observed in tumor tissues (Figs. 2, 3). Two to four mitotic figures were seen in a high power field. This histopathology was identical to that of bladder rhabdomyosarcoma reported in humans [2, 3] and dogs [1, 4, 8, 9]. Metaplastic bone formations, mild infiltration of neutrophils and hemorrhage were observed.

Immunohistochemically, all tumor cells gave positive reactions for anti-vimentin and desmin antibodies. Occasional cells, particularly cells with cross-striations in the cytoplasm, reacted moderately to strongly with anti-myoglobin antibody (Fig. 4). On the contrary, tumor cells were negative for keratin and α -smooth muscle actin. Ultrastructurally, various amount of myofilaments were characteristically seen in the cytoplasm of tumor cells examined (Fig. 5). These filaments were arranged in parallel arrays or bundles, and Z-band structures, a characteristic of striated muscle cells, were also confirmed (Fig. 5). Furthermore, tumor cells had abundant glycogen granules and well-developed mitochondria.

On the basis of histological, immunohistochemical and

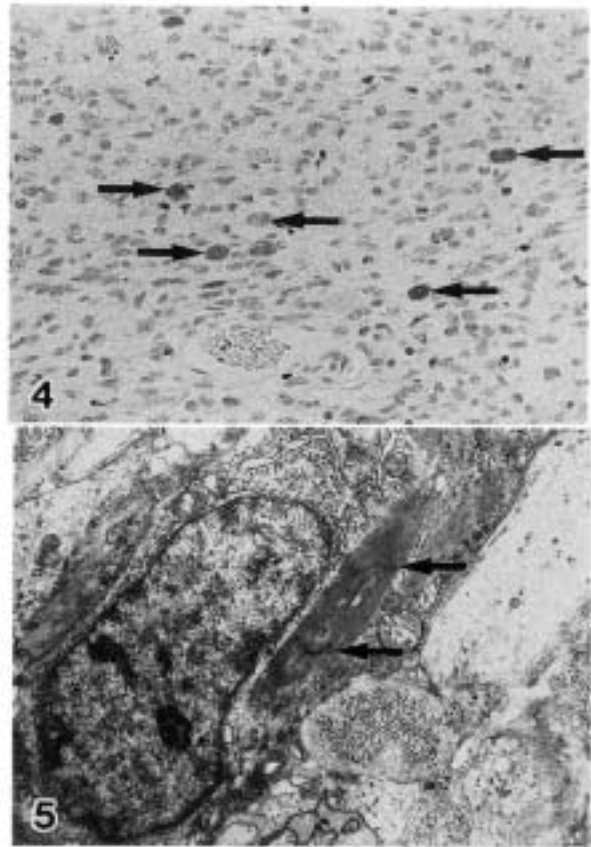


Fig. 4. Myoglobin immunoreactions are observed in the tumor cells (arrows). $\times 280$.

Fig. 5. Ultrastructure of the tumor cells. Note abundant myofibrils and Z bands (arrows) in the cytoplasm. $\times 7,200$.

ultrastructural findings, the present tumor was diagnosed as a bladder rhabdomyosarcoma (sarcoma botryoides). The present case may be the first report of canine bladder rhabdomyosarcoma in Japan.

Predisposition of the bladder rhabdomyosarcoma has been described in the large breed dog, particularly in St. Bernard breed [5]. It has been reported that similar tumors in humans originate mainly in the submucosa of the posterior bladder wall, with particular preference to the regions of the bladder neck [2]. In the present case, the largest, multilobulated masses were also found in the bladder neck; this might indicate the primary origin of the tumor. When we find a bladder botryoid mass in a young, large-breed dog by clinical examinations, a possible occurrence of rhabdomyosarcoma should be taken into consideration.

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