A Case of Glomus Tumor in a Dog

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ABSTRACT. A subcutaneous mass at the digit of the left-hind limb of a 12-year-old, male mongrel dog was examined. A white firm mass, approximately 1 × 2 cm in diameter, was excised surgically. Histopathologically, the mass formed multiple nodules consisting of mixed proliferation of round epithelioid cells arranged in cord or sheet-like structures and small spindle cells forming loose irregular bundles. The epithelioid cells often showed proliferation around the blood vessels. A few giant cells scattering in the neoplastic foci were observed. The neoplastic cells were positive for alpha-smooth muscle actin and vimentin, and were negative for cytokeratin (AE1/AE3), desmin, factor-VIII related antigen, S-100 protein, and neuron specific enolase. On the basis of these findings, this tumor was diagnosed as glomus tumor. Since the present neoplasm had neither recurrence nor distal metastasis during the 12 month after surgical resection, the biological natures of the present neoplasm are supposed to be benign.

KEY WORDS: canine, digit, glomus tumor.

Glomus tumors originated from the glomus body, the arteriovenous anastomosis, are rare neoplasms in the distal extremities including subungual region of the fingers in animals [1, 9]. In humans, the neoplasms have been reported in almost every part of the body, including the nail bed, ventral cut surface of the digit, palm, foot, and ear [10]. Although glomus cell is one of the modified smooth muscle cells, the neoplastic cell has several directions of differentiation, such as glomus cells, blood vessels, and smooth muscle cells. Based on the morphology and differentiation, human glomus tumors are classified into three subtypes, glomus tumor, glomangioma, and glomangiomyoma [10]. A malignant form of the tumors, glomangiosarcoma characterized by its high mitotic rate, high cellularity, and pleomorphism are rarely reported in human cases. Although glomangiosarcomas show malignant morphology, most have been said to be clinically benign [10].

To date, two cases of canine glomus tumor were reported [1, 8]. These cases commonly composed by round to oval neoplastic cells arranged in the nests, sheet or ductal structures, occasionally, multinuclear giant cells, while spindle-shaped cells were not prominent. Immunohistochemically, the neoplastic cells were intensely positive for smooth-muscle actin (SMA) and vimentin, and were negative for cytokeratin, S-100 protein, neuron specific enolase (NSE), and CD34. Since there are a few reported cases, the biological features of canine glomus tumors are not well elucidated. The present paper describes the morphological features of a canine glomus tumor and discusses the biological nature and clinical prognosis.

A mass was found at the digit of the left pelvic limb of a 12-year-old, male mongrel dog. During the period of one month before the animal was taken to the hospital, the dog continuously licked the digit. A small part of the mass was excised surgically for the pathological examinations. Histopathologically, the mass consisted of the proliferation of round epithelioid clear cells arranged in cord-like structures. The neoplastic cells had a round nucleus with distinct nucleoli and sometimes showed proliferation around the vessels. Based on the histopathological findings of the first biopsy, the whole mass including bones of the digit was removed surgically.

The excised mass, approximately 1 × 2 cm in diameter, was white and multi-lobulated on surface (Figs. 1 and 2). The whole mass was fixed with 10% formalin and embedded in paraffin. Paraffin sections of 2–4 µm thick were made and stained with hematoxylin and eosin (HE). Immunohistochemistry was performed using the envision polymer reagent (Dako-Japan, Kyoto, Japan). Primary antibodies were mouse monoclonal antibodies against vimentin (prediluted, Dako-Japan), alpha-SMA (Prediluted, Dako-Japan), neuron specific enolase (NSE, Prediluted, Dako-Japan), desmin (Prediluted, Dako-Japan), cytokeratin (AE1/AE3, Prediluted, Dako-Japan), and factor VIII-related antigen (Prediluted, Dako-Japan), and rabbit antisera against cow S-100 protein (Prediluted, Dako-Japan). Pre-treatment by hydrated autoclave at 121°C for 15 min was performed for vimentin-, cytokeratin-, and SMA-immunostainings.

Histopathologically, the neoplastic foci were found between the dermis and subcutis with some necrotic areas. The dominant neoplastic cells were round epithelioid cells with hypochromatic nuclei and scant amphophilic indistinct cytoplasm (Fig. 3). Occasional clear cell features were observed in the neoplastic cells. The nuclei of the neoplastic cells varied in size, sometimes very large, approximately 20 to 30 µm in diameter and contained distinct plural nucleoli (Fig. 4). The average of mitotic figures of neoplastic cells was 0–1 per high power magnification field (× 400). The round epithelioid cells were arranged in cord or sheet-like structures. In addition, the epithelioid cells tended to show
Fig. 1. Digital mass, dog. A subcutaneous mass (arrow) approximately 1 × 2 cm in diameter at the digit of the left pelvic limb (arrow).

Fig. 2. Digital mass, dog. The cut surface of the excised mass is white and multilobulated in appearance.

Fig. 3. Digital mass, dog. A neoplastic focus consisting of solid proliferation of round epithelioid cells arranged in cord-like structures. HE. × 250.

Fig. 4. Digital mass, dog. A neoplastic foci consisting of neoplastic cells varied in size, sometimes remarkably large nuclei (arrows), approximately 20 to 30 μm in diameter. HE. × 200.

Fig. 5. Digital mass, dog. The epithelioid neoplastic cells proliferate around a vessel wall (arrow). HE. × 100.

Fig. 6. Digital mass, dog. A substantial number of tumor cells are intensely positive for SMA. Immunohistochemistry. × 250.
proliferation around the vessel walls (Fig. 5). Small spindle cells formed loose irregular bundles with a small amount of mucinous stroma. Slit-like blood vessels were distributed throughout the neoplastic foci. Immunohistochemically, a substantial number of the neoplastic cells were strongly positive for vimentin and SMA (Fig. 6) and were negative for NSE, desmin, AE1/AE3, factor VIII-related antigen, and S-100 protein. Based on these histological and immunohistochemical features, the present case was diagnosed as glomus tumor.

As differential diagnoses of canine glomus tumor may include trichoblastoma, canine hemangiopericytomas, and synovial sarcomas. Trichoblastomas sometimes show differentiation to hair follicles or other skin appendices and are intensely positive for cytokeratin [4]. The basic natures of the trichoblastoma are different from those in the present case. Among other sarcomas, synovial sarcomas seem to need most careful distinction from glomus tumor, because the present tumor located in the digit adjacent to the synovial joint and had biphasic-like pattern with epithelioid and sarcomatoid components of synovial sarcomas. However, the epithelioid cells of synovial sarcomas are positive for cytokeratin [3, 11]. Canine hemangiopericytomas consists of spindle-shaped tumor cells surrounding thin-walled vascular channels, and the neoplastic cells are also arranged in interfacing bundles or storiform pattern. However, epithelioid morphology of the tumor seems to be rare [5]. In addition, these neoplasms have complicated immunohistochemical features; the neoplastic cells are positive for several markers, such as vimentin, S-100, NSE, SMA, desmin, and factor VIII-related antigen [2, 6]. Unlike canine hemangiopericytomas, the neoplastic cells in the present case had rather simple immunohistochemical natures that were intensely positive for SMA and vimentin, suggesting smooth muscle-related origin.

Out of three-reported glomus tumors, two in dogs [1, 8] and one in cat [9], two neoplasms occurred at the digit [1, 9]. In addition, all these cases [1, 8, 9] were morphologically characterized by solid growth of SMA- and vimentin-positive round epithelioid cells with occasional proliferation around the vessel walls. The features of the present canine neoplasm are almost consistent with those of previously reported cases in dog and cat [1, 9]. These findings may indicate that glomus tumors in animals may arise predominantly in the digit, and the neoplastic cells have round or epithelioid morphology with intense immunoreactivity for vimentin and SMA. In addition, perivascular proliferation-pattern of the round neoplastic cells may be one of the diagnostic hallmarks of the tumor. Since the present canine case had neither recurrence nor distal metastasis during the 12 months after surgical resection, the clinical prognosis seem to be benign as suggested in a feline case [9] as in human cases [7, 10].

REFERENCES