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Case Report

Canine hemangiopericytoma in a young native Ghadrejani dog: histopathological and immunohistochemical diagnosis

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ABSTRACT

A sixteen-month-old male Ghadrejani dog was referred to the veterinary clinic with a swelling mass on the first finger of the right hand. Clinical examination revealed swelling, erythema and alopecia with ulceration. CBC, radiographs of the affected area and chest, and regional lymph node examination were reported as normal. Histopathological examination revealed a subcutaneous, multilobular, unencapsulated but well-circumscribed tumor with a fingerprint pattern of spindle cells arranged around a central capillary. Immunohistochemical analysis showed that the neoplastic cells expressed vimentin and did not express α-smooth muscle actin (SMA) and S100 protein. Based on the histopathological and immunohistochemical findings, the tumor was diagnosed as canine hemangiopericytoma (CHP). This is the first report of CHP in a young indigenous Ghadrejani dog. This report demonstrates that not only can CHP occur in young dogs, but that differentiation from other soft tissue sarcomas requires not only histopathological findings but also immunohistochemical examination.

همانژیوپری سیتوما در یک قلاده سگ جوان بومی قهدریجانی: تشخیص هیستوپاتولوژی و ایمونوهیستوشیمی

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چکیده

یک سگ نر قهدریجانی شانزده ماهه با توده متورم در انگشت شماره یک دست راست به یک کلینیک دامپزشکی ارجاع داده شد. معاینه بالینی، تورم، قرمزی و آلوپسی همراه با زخم را نشان داد. بررسی تعداد سلول های خونی، رادیوگرافی ناحیه درگیر و قفسه سینه و همچنین معاینه غدد لنفاوی ناحیه ای، طبیعی گزارش شد. معاینه هیستوپاتولوژیک، یک تومور زیر جلدی چند لوبولی و بدون کپسول اما بخوبی محدود شده با آرایش سلول‌های دوکی در اطراف یک مویرگ مرکزی به عنوان الگوی اثر انگشت نشان داد. تجزیه و تحلیل ایمونوهیستوشیمی نشان داد که سلول های نئوپلاستیک ویمنتین را بیان کردند و α-اکتین عضله صاف (SMA) و پروتئین S100 را بیان نکردند. با توجه به یافته های هیستوپاتولوژیک و ایمونوهیستوشیمی، تومور به عنوان همانژیوپری سیتومای سگ تشخیص داده شد. این اولین گزارش همانژیوپری سیتومای سگ در یک سگ جوان بومی قهدرجانی است. این گزارش نشان داد که نه تنها همانژیوپری سیتومای سگ می تواند در سگ های جوان رخ دهد، بلکه تمایز آن از سایر سارکوم های بافت نرم نه تنها به یافته های هیستوپاتولوژیک نیاز دارد، بلکه نیاز به بررسی ایمونوهیستوشیمی نیز دارد.

واژه های کلیدی: سگ، قهدریجانی، همانژیوپری سیتوما، هیستوپاتولوژی، ایمونوهیستوشیمی

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INTRODUCTION

Canine hemangiopericytomas (CHPs), a group of perivascular wall tumors (PWTs), are mesenchymal neoplasms that are common in dogs and rare in cats [1]. In dogs, CHPs account for 9% of all cutaneous and subcutaneous spindle cell tumors [2].

CHPs were originally thought to arise from Zimmerman's pericytes, although the cell origin is still unclear [3]. The histopathological, immunohistochemical and electron microscopic findings of CHP are consistent with some other spindle cell tumors, so it seems that the origin of CHP may not only be pericytes, but also myopericytes, vascular myocytes and fibrocytes[4]. CHPs are usually diagnosed in dogs aged 7-10 years and large breeds seem to be more susceptible, but there is no sex predilection [1, 5, 6]. Clinically, CHPs occur in the subcutaneous tissues of the extremities and rarely on the trunk and head [1]. They usually observe solitary, well circumscribed and lobulated, with pseudocapsule, in grey-white to reddish-brown color [5]. Clinical behavior of CHP is usually benign with low metastatic rate (0-3.8%) [6, 7]. CHP shows a local aggression and reported recurrence that can lead to euthanasia of dog [8]. If the tumor recurs, it may be more aggressive [9]. The tumor on the distal extremities has a high risk of local recurrence [10]. Approximately 70% of CHP can be treated by surgery and the tumor can be removed with extensive peripheral margins [9]. Radiotherapy has been shown in some cases to control tumor growth and prolong survival [8]. This is the first report of CHP in a young native Ghadrejani dog according to histopathological and immunohistochemistry examinations. The Ghadrejani dog, also known as the Central Iranian Shepherd, is a very strong, alert and independent livestock guard dog native to Iran. These dogs are a large breed and are primarily bred to protect livestock from various predators such as wolves [11].

This is the first report of CHP in a young native Ghadrejani dog as determined by histopathology and immunohistochemistry.

CASE PRESENTATION

A sixteen-month-old male Ghadrejani dog was referred to the Mehregan Veterinary Clinic in Isfahan, Iran, with a swelling mass on the first finger of the right hand of one month's duration. On clinical examination, the affected finger showed swelling, redness and alopecia with ulceration (Figure 1). CBC, radiographs of the affected area and chest, and regional lymph node examination were reported as normal. Incisional biopsy of the lesion was performed under general anesthesia. The incisional biopsy specimens were prepared for histopathological examination without removing the entire lesion. The samples were sent to Isfahan Veterinary Pathology Centre in 10% buffered formalin. After tissue processing, 5-micron sections were prepared from the samples and examined microscopically after hematoxylin and eosin (H&E) staining. In addition, immunohistochemistry for vimentin, S100 and α-smooth muscle actin (SMA) markers was performed on formalin-fixed and paraffin-embedded samples. All samples were sectioned at 4μm and processed for immunohistochemistry (IHC). Briefly, for these markers, slides were deparaffinized and subjected to antigen retrieval, endogenous peroxidase blocking and power blocking. They were then incubated with the primary antibodies. This incubation was followed by incubation with the respective secondary

antibodies, as biotinylated anti-mouse antibodies for S100 (colon 4C4.9, dilution 1: 100, Vitro SA Co, Spain), vimentin (colon SP20, dilution 1: 200, Vitro SA Co, Spain) and SMA (colon 1A4, dilution 1: 250, Biocare Medical Co, USA). [8]

Histopathological and Immunohistochemical evaluation

Microscopic examination revealed a subcutaneous, multilobular and unencapsulated but well-circumscribed tumor associated with perivascular whorled spindle cell clusters. The large perivascular whorled arrangements of neoplastic cells had a classic fingerprint pattern. The spindle cell whorls

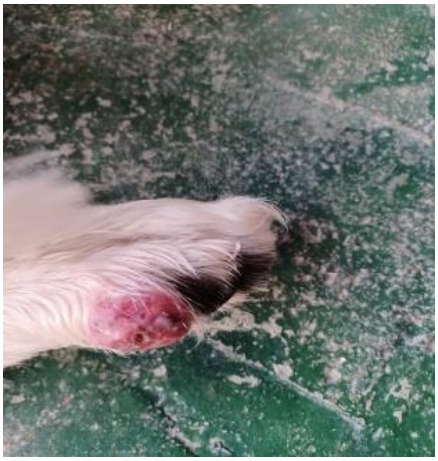

Figure 1. Canine haemangiopericytoma. The affected finger showed swelling, redness and alopecia with ulceration.

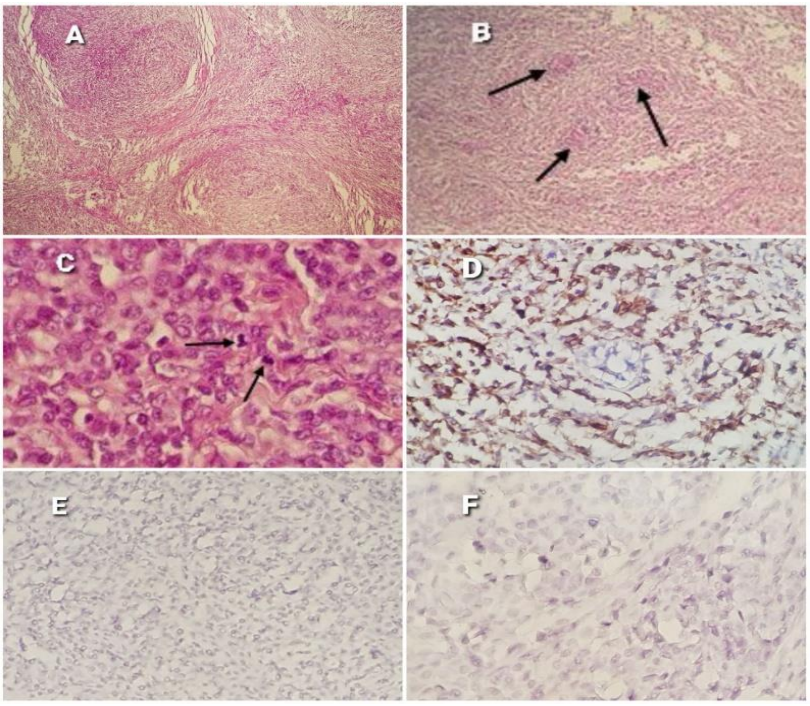

Figure 2. (A): Histopathological examination revealed a subcutaneous, multilobular, and unencapsulated but well-circumscribed tumor. (B): Arrangements of spindle cells around central capillaries (arrows) were observed as a fingerprint pattern, a hallmark of canine hemangiopericytoma. (C): Numerous mitoses were observed throughout the tumor (arrows). H&E, ×400. (D): Immunohistochemistry of tumor cells around capillaries was positive for vimentin. (E): Immunohistochemistry of tumor cells around capillaries was negative for SMA. (F): Immunohistochemistry of tumor cells around capillaries was negative for S100 protein. IHC,

were arranged around a single central capillary (Figures 2A and 2B). The neoplastic cells showed anisocytosis and anisokaryosis associated with elongated to oval/round vesicular nuclei and eosinophilic to amphophilic poorly defined cytoplasm. These cells were separated by a collagenous stroma. The tumor was infiltrated by mononuclear inflammatory cells and mitotic figures were numerous (Figure 2C). Infection and bacterial colonies were present in some areas, suggesting secondary infection of the lesion. Immunohistochemistry was positive for vimentin (Figure 2D) and negative for SMA (Figure 2E) and S100 (Figure 2F). Based on the histopathological and immunohistochemical findings, the mass was diagnosed as a hemangiopericytoma. As the best course of action in this case was surgery, the affected finger was amputated. The animal is currently in a good state of health.

DISCUSSION

The diagnosis of CHP is made on the basis of histological findings such as the perivascular whorl pattern as a hallmark of CHP [8, 9]. However, this pattern can also be seen in other canine soft tissue sarcomas (STSs) such as myofibroblastic fibrosarcoma, fibrosarcoma, peripheral nerve sheath tumour (PNST), spindle cell histiocytic sarcoma, spindle cell glomus tumour and leiomyosarcoma [12,13]. The STSs could be differentiated by the common haematoxylin and eosin staining method, as the whorl pattern observed in these tumours is not arranged around vascular structures. [1]. For example, fibrosarcomas and myofibroblastic fibrosarcomas have a cellular similarity to hemangiopericytoma, but identical to PNST, neoplastic cells show a whorl pattern around a collagenous centre, but lack concentric perivascular whorls [14]. Spindle cell histiocytic sarcomas usually have a mixture of spindle cells and round large cells. Similar to PNST, the pattern whorls are not arranged around small vascular structures. Spindle cell glomus tumours are described by neoplastic cells around vascular structures, but may have more prominent and bulkier spindle cells than CHP [5]. Also, whorl patterns in leiomyomas are lacking concentric perivascular structures on H&E staining [1]. Immunohistochemistry is important and helpful in differentiating STS from CHP. The most commonly used immunohistochemical biomarkers to rule out the other cutaneous spindle tumours include vimentin, α-smooth muscle actin, CD34, CD31, desmin, S100, cytokeratin, factor VIII, glial fibrillary acidic protein (GFAP) and lysozyme [4, 13]. Vimentin is an intermediate filament commonly used to differentiate between epithelial and mesenchymal neoplasms [14]. In this case, the vimentin biomarker was positive, indicating that the tumour was a mesenchymal tumour. On the other hand, S100 protein has been reported to be uniformly negative in CHP [2, 13]. In the present case, S100 protein was also negative. S100 protein is a marker that is predominantly found in nervous system and neuroendocrine tumours. Therefore, this protein is often used to differentiate PNST, neurofibromas, fibrosarcomas and PWT. Many neoplastic cells are S100 positive in PNST, few in neurofibromas and none in fibrosarcomas and PWT [15]. SMA is expressed in CHPs derived from canine pericytes of arterioles, venules and capillaries in the tumour [13]. In this case, SMA was negative on immunohistochemical examination. The expression of SMA in CHP is not related to the degree of histological differentiation [16]. Perez et al (1996) showed that 12 of 22 well-differentiated CHP (grade I) were SMA negative and only five of eight CHP (grade III) were SMA positive. This fact, in addition to the absence of SMA in 22 CHP, was attributed to the different degree of smooth muscle differentiation of neoplastic pericytes [13]. Pericytes have been shown to be pluripotent cells that express different antigens depending on their location [16]. Pericytes of arterioles and venules mainly express SMA, whereas pericytes of capillaries predominantly express non-SMA isoforms [17]. It has also been reported that neoplastic pericytes appear to lose SMA antigens as they differentiate [18]. However,

leiomyosarcomas are the only tumours that are SMA positive by immunohistochemistry. Furthermore, the expression of SMA in CHP cases may be helpful in differentiating CHP from some other tumours such as fibrosarcoma, PNST and fibrous histiocytoma [13, 18].

In conclusion, this report has shown that not only can CHP occur in young dogs, but it can also be very difficult to differentiate it from other STSs based on histopathological findings. Therefore, immunohistochemical examination may be helpful in the diagnosis of CHP in dogs.

ETHICS

Approved.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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