Histopathological observations on vulvar transmissible venereal tumor in a dog

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Abstract

The transmissible venereal tumor (TVT) is a contagious and sexually transmissible neoplasia with a low metastatic rate and no breed or sex predilection. The present study describes the occurrence of the vulvar TVT in a 4-year-old female mix-breed dog. Based on owner information, within the previous 1-month period, the mass had become evident. Macroscopically, it was hyperemic and ulcerated. Finally, complete surgical removal was selected. Microscopically, the mass was composed of loose sheets, rows, and cords of relatively uniform round to ovoid cells. By immunohistochemical staining, the neoplastic cells were positive for vimentin and were negative for cytokeratin, desmin, S-100, CD3, and CD79a. Transmissible venereal tumor was diagnosed based on the anatomical location of the tumor and histopathological findings. The dog was treated weekly, for 6 weeks, with vincristine. No new growth of the mass was observed 4 months after the end of therapy. According to the literature, complete surgical excision and treatment with antimitotic agents, such as vincristine sulfate is effective.

Keywords: Dog, TVT, Pathology, IHC, Chemotherapy

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Introduction

Canine transmissible venereal tumor (CTVT), known as contagious round cell tumor of dogs, is a horizontally transplantable tumor, with no breed or sex predilection (Park *et al*., 2006). TVT can find at any age, but it is common at 2-5 years (Hayes *et al*., 2023). Canine TVT affects the genital mucosa but may also be transmitted to the conjunctiva, nasal and oral cavity, skin and the rectum by sniffing, licking or scratching (Mukaratirwa and Gruys, 2003; Rezaei *et al*., 2016; Pimentel *et al*., 2021). Less commonly, the tumor may be found in other areas, including the peritoneum, tonsils, eye, liver, spleen, kidney, lung, and musculature (Pereira *et al*., 2000; Mukaratirwa and Gruys, 2003). Macroscopically, this tumor in male dogs has an appearance similar to a cauliflower like growth on penis, but in females, this neoplasm is seen as hemorrhagic and granulomatous neoplastic masses (Bulhosa *et al*., 2020). Surgical excision, chemotherapy, radiotherapy, immunotherapy, biotherapy, cryosurgery and electrocautery are the treatment options for TVT (Kabuusu *et al*., 2010; Bendas *et al*., 2022; Antonov, 2015). The present study, describes history, clinical signs, histopathological findings and response to chemotherapy with vincristine sulfate of the TVT in a dog.

Material and Methods

In May 2023, a 4-year-old intact female mix-breed dog, weighing 11 kg was referred to the veterinary hospital. On physical examination, the ulcerated mass was protruding from the surface of the vulva (Fig. 1). The rectal temperature was 38.6°C, respiratory rate was 19 breaths/min, and heart rate was 105 beats/min. Results of the complete blood count and urinalysis were within the normal range. Based on owner information, within the previous 1-month period the mass had become evident and grew larger. Finally, complete surgical removal was selected. On gross examination, the mass was approximately 4×1/5×3 cm in size and had a firm consistency. It was hyperemic and ulcerated. Tissue samples of the mass were fixed in 10 % neutral buffered formalin, routinely processed, dehydrated, embedded in paraffin wax, sectioned at 5 µm in thickness (Rotary Microtome RM2 145; Leica, Wetzlar, Germany) and stained with Haematoxylin and Eosin. Sections were examined using a light microscope (E600; Nikon, Tokyo, Japan) and representative images were taken. For immunohistochemistry, the avidin biotin- peroxidase complex (ABC) method was used with primary antibodies to Vimentin, cytokeratin, desmin, S-100, CD3, and CD79a.

Figure 1: Vulvar Transmissible venereal tumor in a female mix-breed dog.

Result

In histopathological investigations, the mass was composed of loose sheets, rows, and cords of relatively uniform round to ovoid cells (Fig. 2A-B). Cell margins were generally indistinct. Nuclei were large, round, with a single centrally placed nucleolus. There was a moderate amount of light amphophilic to clear cytoplasm. Anisokaryosis was mild to moderate, and mitotic rates were moderate, ranging from 2 to mitoses per 400× microscopic fields (Fig. 2C). The cells were separated into cell islands via thin fibrous tissue (Fig. 2B). Variable numbers of lymphocytes, plasma cells, and macrophages were infiltrated the tumor. Focal necrosis was present in some areas (Fig. 2D).

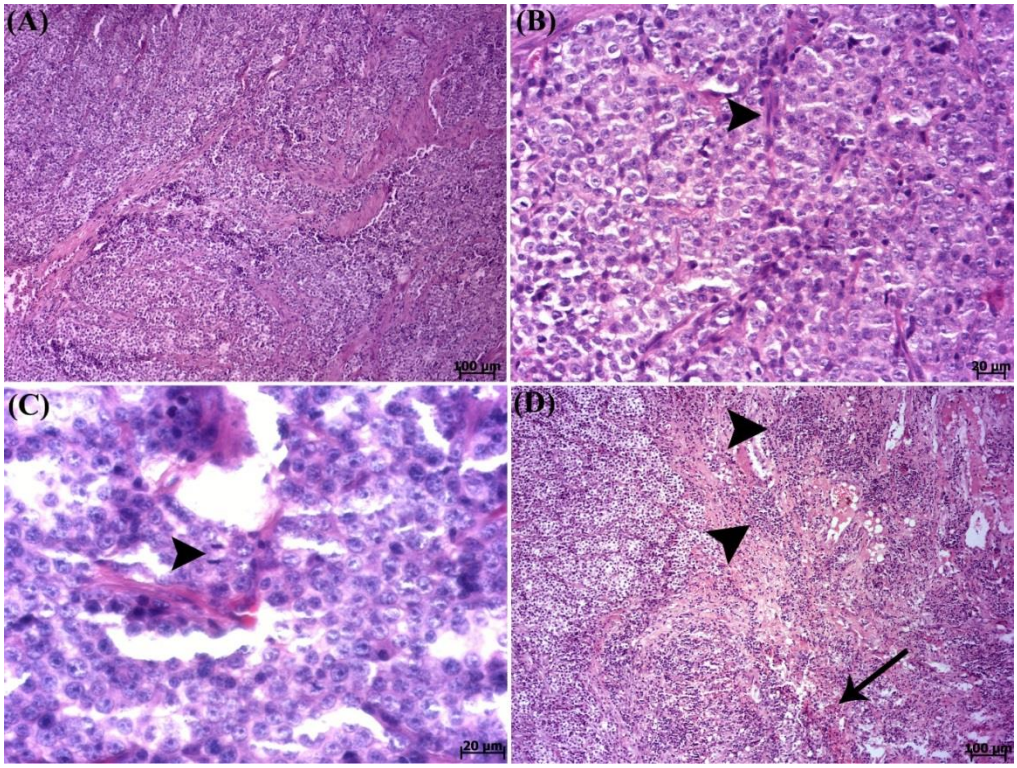

Figure 2: (a-d) Histopathological findings of vulvar TVT in a dog. (A): diffuse sheets of round cells, (B): scant amounts of connective tissue stroma (arrowhead), (C): Mitotic figure (arrowhead), (D): Lymphoplasmacytic infiltration in the tumor (arrowheads) and focal necrosis (arrow), H&E.

Immunohistochemically, the sections were positive for Vimentin (Fig. 3). The neoplastic cells were negative for cytokeratin, desmin, S-100, CD3, and CD79a. Transmissible venereal tumor was diagnosed based on the anatomical location of the tumor, histopathological and immunohistochemical findings. The dog was treated weekly, for 6 weeks, with vincristine (0.025 mg/kg, IV, Oncovin, Lilly-Farma, Lilly, France). Four weeks after endings chemotherapy, the results of a CBC and urinalysis were normal. Based on owner information, no new growth of the mass was observed 4 months after the end of therapy.

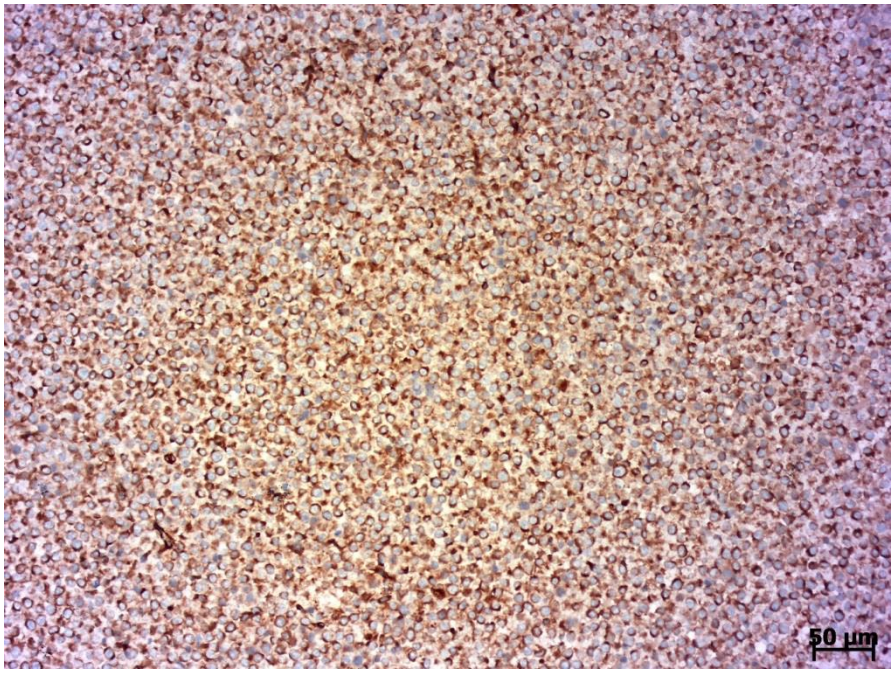

Figure 3: Positive reactivity for Vimentin of vulvar TVT in a dog, IHC.

Discussion

Canine transmissible venereal tumor (CTVT) is a neoplasm transmitted by the physical transfer of viable tumor cells by direct contact with ulcerated skin or mucous tissue (Birhan and Chanie, 2015). This canine tumor is a round cell neoplasm with widespread distribution, particularly in region with tropical and subtropical climates (Ganguly *et al*., 2016). The neoplasm affects dogs and other canids, such as foxes, coyotes and wolves (Bulhosa *et al*., 2020). Young, stray and sexually active dogs of any breed, age and sex are susceptible. Although the age of animals affected by TVT ranged from one to ten years, and the highest frequency occurred in the age group two to five years old (Pigatto *et al.,* 2011). Vestibule and vagina of the female dogs have been documented as the most affected sites of TVT (Bulhosa *et al*., 2020). According to the literature, TVT should be differentiated from other round cell tumors including histiocytoma, lymphoma, and mast cell tumor. Immunohistochemical identification are essential for an accurate histopathological diagnosis. In this case, the neoplastic cells were positive for vimentin. Vimentin is a specific marker of mesenchymal differentiation (Hazzah, 2020) and stains positive in TVT, fibrosarcoma, melanoma, mastocytoma, leiomyosarcoma, and liposarcoma (Hendrick, 2017). Moreover, the neoplastic cells were stained negative for Desmin. So, this result revealed that this tumor could not originate from muscle cells. Unlike this case, positive IHC reactivity for Desmin is supportive of rhabdomyosarcoma (Hendrick, 2017; Roccabianca *et al.,* 2020). The mass was also stained negative for cytokeratin (marker of carcinoma), S-100 (marker of amelanotic melanoma), CD3 and CD79a (markers of lymphoma) (Hendrick,

2017). Moreover, the site of the mass is important in the diagnosis of tumor (Rezaei *et al*., 2016). In the current case, diagnosis of TVT was confirmed by histopathological findings that was similar to previous reports (Kabuusu *et al*., 2010; Chikweto *et al*., 2013). According to our findings, this benign tumor mostly appears as a firm, friable and hemorrhagic mass (Islam *et al*., 2014). In this report, in histopathological findings, variable numbers of lymphocytes, plasma cells, and macrophages were infiltrated the tumor. Lymphoplasmacytic infiltration and the presence of macrophages in the tumor showed localized antibody-mediated control of TVT (Bulhosa *et al*., 2020). The prognosis of this tumor is good. The complete surgical removal of neoplasm is the therapeutic procedure with the highest probability of cure (de Amaral *et al*., 2020). Antimitotic agents, such as cyclophosphamide, methotrexate, vincristine and vinblastine are the chemotherapeutic drugs for treating and vincristine sulfate is the most frequently used in veterinary medicine (Abeka, 2019). Similar to the present study, complete surgical excision, and treatment with vincristine sulfate is effective (Kabuusu *et al*., 2010).

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