

# Intra-abdominal transmissible venereal tumor in a dog: a case report

Tumor venéreo transmissível intra-abdominal em cadela: relato de caso

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## Abstract

Transmissible venereal tumor (TVT) is a malignant round cell neoplasm that primarily affects the genital region of dogs. Despite being sexually transmitted, transmission can occur through contact with mucous membranes and cutaneous tissue. Although less routine, TVT has been described in several extragenital regions, such as the nasal plane, oral cavity, eyeball, eyelid, and anus. Although metastases are infrequent, they can occur in the skin, inguinal lymph nodes, liver, kidneys, spleen, intestine, heart, brain, lungs, and other organs. The clinical signs of TVT are usually related to serosanguineous secretion, intense odor, deformity, ulceration, and possibly areas of necrosis. In cases of metastases, clinical signs will depend on the affected organ. The treatment of choice for TVT is chemotherapy with vincristine. The present study aimed to report the case of a 2-year-old mixed-breed canine with intra-abdominal nodules detected by ultrasound examination, which were later diagnosed as a TVT by histopathology and immunohistochemistry.

**Keywords:** abdominal neoplasm, immunohistochemistry, round cell neoplasm.

## Resumo

O tumor venéreo transmissível (TVT) é uma neoplasia maligna de células redondas que acomete principalmente a região genital de cães. Apesar de ser sexualmente transmissível, a transmissão pode ocorrer através do contato com mucosas e tecidos da pele. Embora menos rotineiro, o TVT tem sido descrito em diversas regiões extragenitais, como plano nasal, cavidade oral, globo ocular, pálpebra e ânus. Embora as metástases sejam infrequentes, elas podem ocorrer na pele, linfonodos inguinais, fígado, rins, baço, intestino, coração, cérebro, pulmão e outros órgãos. Os sinais clínicos do TVT geralmente estão relacionados à secreção serossanguinolenta, odor intenso, deformidade, ulceração, podendo ou não haver áreas de necrose e, nos casos de metástases, os sinais clínicos vão depender do órgão acometido. O tratamento de escolha para TVT é a quimioterapia, com uso de vincristina. O presente trabalho tem como objetivo relatar o caso de um canino de dois anos de idade, sem raça definida, com nódulos intra-abdominais detectados ao exame ultrassonográfico, que posteriormente foram diagnosticados como tumor venéreo transmissível por meio de histopatologia e imunohistoquímica.

**Palavras-chave:** neoplasia abdominal, imuno-histoquímica, neoplasia de células redondas.

## Introduction

Canine transmissible venereal tumor (TVT), also known as canine condyloma, granuloma venereum, infectious sarcoma, or venereal lymphosarcoma, is the oldest known tumor and is among the main neoplasms affecting dogs (Dagli, 2019; Daleck & Denardi, 2016).

Currently, TVT is classified as a round cell neoplasm (Hedlund, 2005), in the same group as mast cell tumors, basal cell carcinomas, histiocytomas, and lymphomas (Vermooten, 1987). This neoplasm is naturally contagious and sexually transmitted among dogs, especially those of straying life and of reproductive age (Tinucci-Costa & Castro, 2009), and possibility of experimental transplantation has also been demonstrated (Silveira et al., 2009). Although sexual acts are the most frequent means of transmission of TVT, other means exist, such as the habit of licking and sniffing other dogs (Oliveira, 2019; Park et al., 2006; Strakova & Murchison, 2014) that can lead



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to tumor cell implantation in the nasal and oral cavities. Additionally, direct contact between sites with skin lesions can cause eye and skin lesions (Lapa, 2009; Tinucci-Costa & Castro, 2009).

Although metastases are not frequent and are rarer than those to extracutaneous locations, which affect approximately 1% of dogs (Tinucci-Costa & Castro, 2009), they can occur in the skin, inguinal lymph nodes, liver, kidneys, spleen, intestine, heart, brain, lungs, and other organs (Brandão et al., 2002; Chikweto et al., 2013; Tinucci-Costa & Castro, 2009).

The clinical signs reported in dogs with TVT and those with genital lesions range from the presence of a mass, which can be single or multiple, usually friable on the foreskin or vulva (Brandão et al., 2002; Oliveira, 2019), serosanguineous secretion, odor intensity, deformity, ulceration, and areas with or without necrosis. When tumors and/or their metastases occur in extragenital regions, other clinical signs may be present depending on the location of the affected organ (Oliveira, 2019), which may manifest in the form of respiratory disorders, such as dyspnea, abdominal pain, and dysphagia (Huppel et al., 2014; Lapa, 2009; Tinucci-Costa & Castro, 2009).

TVT diagnosis in the extragenital regions can be more difficult depending on the anatomical location of the tumors (Oliveira, 2019). However, in both cases, an accurate diagnosis of primary or metastatic TVT can only be established with the aid of cytological or histopathological examination (Oliveira, 2019; Tinucci-Costa & Castro, 2009).

The treatment of choice for this type of neoplasm is chemotherapy (Rogers et al., 1998). Vincristine sulfate is the first-choice drug for the antineoplastic chemotherapy of TVTs, which can be administered at a dose of 0.025 mg/kg up to 1 mg/kg or 0.5 mg/m<sup>2</sup> IV, weekly, for 3-6 weeks, with an interval of 7 days between the doses (Fossum, 2005; Ramadinha et al., 2016; Tinucci-Costa & Castro, 2009). The prognosis is generally considered favorable, with a good response to chemotherapy, total tumor remission, and clinical improvement in the animal. However, in cases exhibiting resistance to chemotherapy or metastases in the central nervous system and eyes, the prognosis is limited (Ganguly et al., 2016; Tinucci-Costa & Castro, 2009).

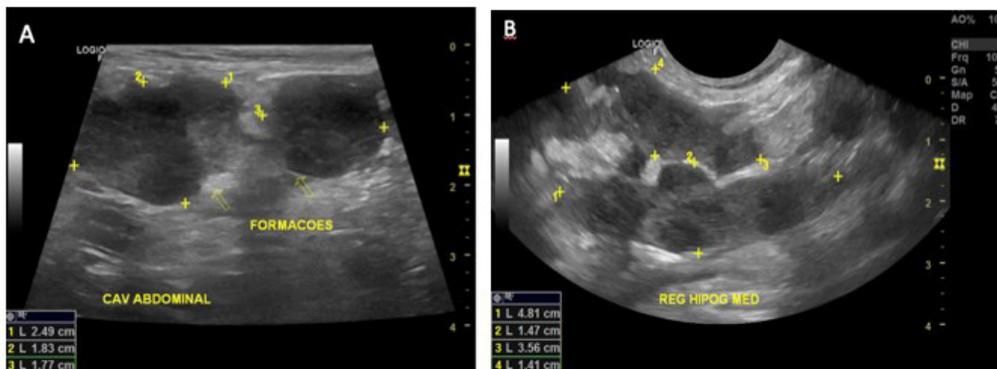
The present study aimed to report the case of a 2-year-old mixed-breed canine, with intra-abdominal TVT.

## Case description

A mixed-breed female canine with an estimated age of 2 years, weighing 8 kg, was brought for care after being found on the street. She was underweight, with pale mucous membranes, fleas, ticks, and other parameters that were within the normal range. A vermifuge was prescribed, ectoparasiticide was administered, blood was collected for blood count, and ultrasound was requested. The hemogram revealed normocytic normochromic nonregenerative anemia (hematocrit 23%; reference value: 37-55%), leukocytosis without left shift (36,100; reference value: 6,000-17,000 n/μL), thrombocytopenia (22,000/μL; reference value: 150,000 - 500,000/μL), and antibodies against *Ehrlichia* spp., *Anaplasma* spp., *Borrelia burgdorferi*, and *Dirofilaria immitis* antigens (SNAP test 4Dx<sup>®</sup> Idexx). The sample was positive for *Anaplasma* spp. and *Ehrlichia* spp. Based on this result, doxycycline (5 mg/kg/BID for 28 days) and prednisone (0.5 mg/kg/SID/5 days) were prescribed. The owner chose to not perform the ultrasound. A return visit was requested within 7 days to reassess the condition and perform a new blood count, but the patient was not brought back to the clinic.

Two months after the first consultation, the patient returned with a complaint of non-specific vomiting, which had started 2 days before the patient's presentation to the clinic. Maropitant (1 mg/kg/SID/SC) was administered, omeprazole (1 mg/kg/SID/5 days) and a homemade diet were prescribed, the ultrasound request was reinforced, and blood analysis was requested, but they were not performed. After the initial improvement, vomiting was noted again at the end of treatment, which was associated with inappetence, anorexia, and prostration. The dog was hospitalized, and the previously requested examinations were performed. Hematological analyses revealed polycythemia (hematocrit 58%; reference value: 37-55%), thrombocytosis (848,000; reference value: 150,000-500,000 n/μL), and leukocytosis (18,500; reference value: 6,000-17,000 n/μL) with a left shift. Biochemical tests revealed an increase in the levels of alkaline phosphatase (116.10; reference value: 8 to 88 mU/mL), urea (146; reference value: 11 to 60 mg/dL), cholesterol (260; reference value: 140 to 210 mg/dL), and decreased levels of potassium (3.10; reference value: 4.37 to 5.65 mEq/L) and sodium (138; reference value: 141.10 to 152.3); the

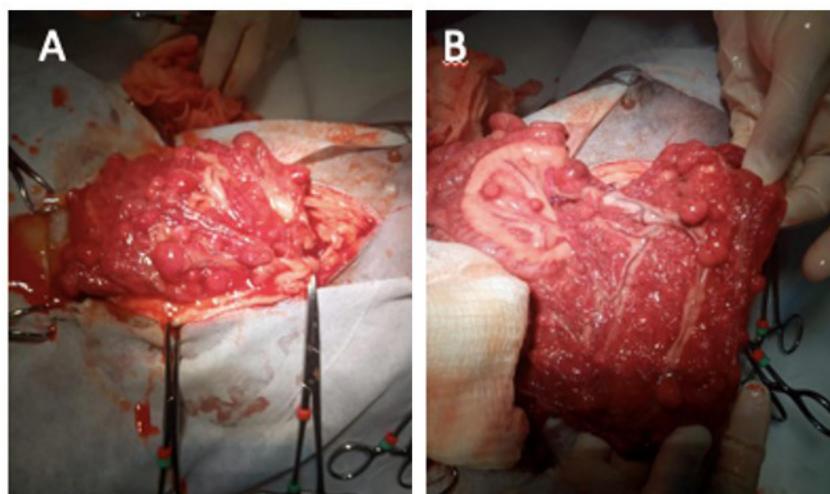
other indexes were within the normal range. Abdominal ultrasonography revealed numerous heterogeneous oval structures, predominantly hypoechoic, with some present in the central region filled with cloudy liquid, measuring from 0.80 x 1.23 cm to 1.47 x 4.81 cm, presence of free fluid with cloudy appearance, rich in debris, a diffuse increase in abdominal echogenicity compatible with peritonitis (Figure 1A and 1B), and an absence of uterus and ovaries.



**Figure 1A and 1B.** Abdominal ultrasound revealing numerous heterogeneous oval structures, predominantly hypoechoic (structures between markers [+]).

An abdominal fluid sample was collected for analysis, in addition to a guided puncture of the nodules for cytology. Fluid analysis revealed several red blood cells, frequent segmented neutrophils, foamy macrophages, and frequent degenerated cells, and the material was classified as pyogranulomatous inflammatory exudate. Cytological examination of the nodules revealed several erythrocytes, frequent neutrophils, and several epithelioid cells with an eccentric nucleus and basophilic and vacuolated cytoplasm, rendering diagnosis unattainable.

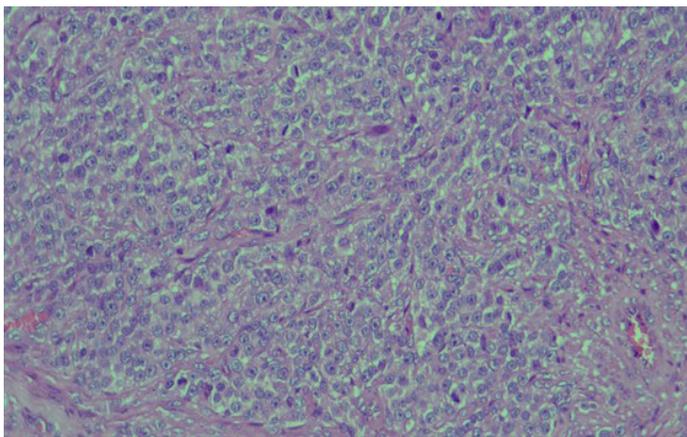
The patient remained hospitalized and was administered meropenem (24 mg/kg/SID/IV), scopolamine with dipyrone (25 mg/kg/TID/IV), ondansetron (1 mg/kg/BID/IV), omeprazole (1 mg/kg/IV), and tramadol (4 mg/kg/BID/IV). Exploratory laparotomy and biopsy for histopathological analysis were chosen owing to the inconclusive fluid and cytology analysis results; additionally, there was no improvement in the clinical picture with the instituted therapy. During laparotomy, diffuse peritonitis, abscess points, and the presence of purulent secretions were observed in the cavity, in addition to several reddish nodules of varying sizes implanted throughout the abdominal cavity (mesentery, omentum, liver, and spleen) (Figure 2A and 2B).



**Figure 2A and 2B.** Exploratory laparotomy revealing multiple reddish nodular formations of varying sizes, implanted throughout the abdominal cavity.

Ten intracavitary nodules were removed for biopsy, and purulent material was collected for culture and antibiogram. The animal stayed in the clinic for 5 days after receiving supportive treatment. During hospitalization, a total of three abdominocenteses were performed, with removal of the purulent fluid (average 400–600 mL). Since no improvement was noted, those responsible decided to request the animal's discharge and returned 2 days later for euthanasia.

Culture and antibiogram revealed the presence of *Proteus* spp., which was sensitive to only two antibiotics tested (neomycin and meropenem) and resistant to all other antibiotics (ampicillin, amoxicillin + clavulanic acid, ceftazidime, ceftriaxone, cefovecin, ciprofloxacin, cotrimoxazole (sulfamethoxazole + trimethoprim), enrofloxacin, gentamicin, tetracycline, marbofloxacin, and norfloxacin). Histopathological analysis of the abdominal nodules revealed a round cell neoplasm, morphologically compatible with a TVT or large cell lymphoma (Figure 3). Based on these findings, we decided to perform immunohistochemical analysis of the neoplasm, which confirmed the presence of TVT.



**Figure 3.** Presence of numerous round to oval cells with multivacuolated cytoplasm. Many cells have more than one nucleolus. Other cytological features of TVT are the granular appearance of karyoplasm owing to chromatin agglomeration and an increased nucleus:cytoplasm ratio.

## Discussion

Since the patient was found on the street, it was not possible to determine her reproductive status from the history/anamnesis. Hemoparasites were initially suspected owing to the presence of ectoparasites (mainly ticks) and pale mucous membranes, and was later confirmed by changes in blood count (regenerative normochromic normocytic anemia, leukocytosis, and thrombocytopenia) and antibody research (Mylonakis et al., 2019). Based on these results, treatment with doxycycline (the antibiotic of choice for the treatment of rickettsiosis) and prednisone (to reduce the immune-mediated reaction) were chosen (Mylonakis et al., 2019). The spay suture wound could not be identified in the linea alba during the abdominal examination; therefore, abdominal ultrasonography was requested to determine whether the patient was spayed, but it was not authorized, and there was no return for a new blood count.

After the onset of vomiting, a new blood count revealed thrombocytosis and polycythemia that could be related to dehydration and the loss of electrolytes through vomiting (hyponatremia and hypokalemia). However, an infectious condition was suspected owing to leukocytosis, with the main suspicion of uterine infection. (Tello & Perez-Freytes, 2017). Ultrasound examination revealed absence of the uterus and ovaries, which may indicate that the patient was spayed. Assessing the etiology of intra-abdominal nodular structures using ultrasound was not possible; hence, ultrasound-guided cytology and analysis of abdominal free fluid were requested.

The fluid was classified as a pyogranulomatous inflammatory exudate, which may explain the leukocytosis revealed in the blood count report. Therefore, antibiotic therapy was added to the protocol established on admission. The cytology of the nodules was inconclusive and may

be related to the limitations of the technique or failures when obtaining the material guided by ultrasound (Magalhães et al., 2001). Owing to the impossibility of concluding the diagnosis, laparotomy and material collection for histopathological evaluation were chosen as the techniques of choice (Magalhães et al., 2001).

During exploratory laparotomy, the absence of the uterus and ovaries was confirmed; however, tissue reactions were noted in the topography of the ovaries and cervix, indicating that the animal had possibly undergone ovariectomy (OVH). The diagnosis of intra-abdominal TVT by histopathology associated with the probable OVH may indicate that the animal, when undergoing the surgical procedure, already had the neoplasm, and that the tumor cells were implanted in the abdomen during the procedure (Bhutani et al., 2016; Ganguly et al., 2016).

Despite the antibiotic (meropenem) treatment, no improvement was observed in the production of purulent abdominal fluid, which eventually led to the decision of euthanasia.

Differential diagnosis for TVT and large cell lymphoma using histopathological analysis was recommended; hence, immunohistochemical analysis, considered the “gold standard” for neoplastic differentiation, was performed (Ganguly et al., 2016), confirming the neoplasm to be a TVT.

## Conclusion

The present study reports a rare case of TVT and demonstrates the importance of laparotomy as an auxiliary method in the diagnosis of neoplasms in the cases where traditional imaging methods have limitations.

## Ethics statement

All procedures were consented by the animal owner.

## Financial support

None.

## Conflict of interests

There is no conflicts of interest.

## Authors' contributions

AJRB - Writing, Review and Editing manuscript. PLNM - The clinical veterinarian responsible for conducting the case and review the manuscript. ABC - The veterinary surgeon responsible for the surgery and review the manuscript. PGH - The veterinary oncologist responsible for monitoring the case and review the manuscript. DVS - The ultrasound veterinarian responsible for the ultrasound exams and review the manuscript.

## Availability of complementary results

The manuscript refers to a case report, with no research data available online.

The study was carried out at the Institute of Specialties in Veterinary Medicine (IEMEV) Botafogo, Rio de Janeiro, RJ, Brazil.

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