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Clinico-Pathology and Therapeutic Management of a Primary Atypical Extra-Genital Ocular Transmissible Venereal Tumour in a Dog in Lusaka, Zambia

Mubita Matale[1], Careen Hankanga[1], Farai Phiri[1], Mercy Mfula Chipolo[1], Mawini Mwandabantu,[1] Katendi Changula[2] and Girja Shanker Pandey[3]*

[1]Department of Clinical Studies, School of Veterinary Medicine, University of Zambia, PO Box 32379, Lusaka, Zambia
[2] Department of Paraclinical Studies, school of Veterinary Medicine, University of Zambia, PO Box 32379, Lusaka, Zambia
[3] Department of Disease Control, School of Veterinary Medicine, University of Zambia, PO Box 323279, Lusaka. Zambia
* Corresponding author
Girja Shanker Pandey, Department of Disease Control, School of Veterinary Medicine, University of Zambia, PO Box 323279, Lusaka. Zambia, pandeygs@gmail.com
Mobile: 0971758264

ABSTRACT

Canine Transmissible Venereal Tumour (CTVT) is a contagious cancer commonly found in the genitalia of dogs, with rare extra-genital presentations, such as cutaneous, oral, nasal, and ocular forms. Extra-genital CTVT cases, especially in the ocular region, are infrequently reported, often leading to diagnostic challenges and underdiagnosis in regions with high prevalence.

A two-year-old male German Shepherd mix was presented to the University of Zambia, School of Veterinary Medicine, with a red, lobulated mass originating from the third eyelid of the right eye, causing partial vision loss and continuous lacrimation. Initial clinical examination suggested ocular squamous cell carcinoma. However, cytology and histopathology findings from a tissue biopsy revealed round and ovoid neoplastic cells with large pleomorphic nuclei, leading to a definitive diagnosis of primary ocular CTVT. The dog exhibited no genital involvement or evidence of tumour spread to other sites.

The dog was treated with vincristine sulphate administered intravenously in six doses over six weeks. Following the second dose, the patient experienced leukopenia, thrombocytopenia, decreased appetite, and weight loss, all common side effects of vincristine. Supportive care, including antibiotics, fluid therapy, and appetite stimulants, was provided, resulting in improved condition. By the end of the treatment, the ocular mass had completely regressed, vision was restored, and the dog remained in remission with no recurrence observed after twelve months.

This case represents the first reported instance of primary ocular CTVT in Zambia without genital involvement. The successful use of vincristine sulphate highlights its efficacy in treating extra-genital CTVT forms. Given CTVT's potential for atypical presentations, it is crucial for veterinarians in endemic areas to consider it in the differential diagnosis of extra-genital ocular masses to prevent underdiagnosis and ensure timely treatment.

Keywords: *Extra-genital, ocular, CTVT, cytopathology, treatment, Zambia*

Introduction

Canine transmissible venereal tumour (CTVT), also known by various names such as Sticker's sarcoma,

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transmissible venereal tumour, contagious venereal tumour, and transmissible lymphosarcoma, is a malignant tumour arising from the uncontrolled growth of histiocytic cells (1, 2). CTVT spreads primarily through direct skin or sexual contact between sexually mature dogs, most commonly affecting free-roaming, sexually active dogs in tropical and subtropical regions (3). Recent evidence, however, indicates that CTVT has been present on all the continents (except Antarctica) for decades (4). The tumour remains a significant concern in countries where dog mating is largely uncontrolled, because it can easily spread from affected dogs to others through injured skin or mucosa (5).

CTVT is considered the oldest known somatic cell line tumour, with its origins estimated to date back between 6,000 and 11,000 years in the post-domestication period of canines, though the exact timeframe is still debated (6). A common consequence of this tumour's malignancy is a gradual loss of body weight in affected dogs, potentially progressing to cachexia (7). Dogs with CTVT may experience pain, bleeding, and exhibit a foul-smelling serosanguineous discharge from the external genitalia, with tumours often appearing as friable, cauliflower-like growths that are red to flesh-coloured (8).

While ocular CTVT is rare, it can occur through auto or hetero-implantation of viable tumour cells (7, 9, 10). In Zambia, Pandey *et al.* (11) documented various canine neoplasms, including TVT, though none were reported as extra-genital. Nalubamba (12) later reported a case of extra-genital CTVT affecting the oral cavity and perianal area in a Zambian dog, which responded successfully to vincristine treatment. Another recent case in Zambia described extra-genital cutaneous CTVT in a dog (13). Despite these reports, there is still a notable lack of published studies on CTVT in Zambia, particularly regarding therapeutic management.

In this case report, the researchers present what is, to our knowledge, the first documented instance of primary, atypical extra-genital CTVT of the lymphocytic subtype occurring in the eye of an adult mixed-breed German Shepherd dog in Zambia. This report describes the clinical, cytological, and histopathological characteristics of extra-genital ocular CTVT, along with successful treatment using vincristine sulphate injection.

Case history, Clinical Observation and Results

A two-year-old intact male German Shepherd mixed breed, weighing twenty-seven kilogrammes, was presented to the Veterinary Clinic at the University of Zambia, School of Veterinary Medicine, on 29 July, 2022, with a complaint of a red mass growing in the right eye. The mass had first appeared approximately four months before presentation and had developed spontaneously. The owner had been cleaning the affected area with a mixture of honey and salt water, but this treatment showed no noticeable reduction in size or improvement in vision. The owner reported that only this dog was affected, despite having another dog kept indoors under similar conditions. Both dogs had up-to-date vaccinations and deworming and were regularly dipped to control ticks and other ectoparasites.

On clinical examination, most parameters were within normal ranges, with the exception of a slightly elevated heart rate, which was attributed to the dog's excitement during the examination. The conjunctiva was hyperemic and moist, and the superficial lymph nodes were non-reactive. Closer inspection revealed a fleshy, lobulated, red, and irregularly shaped mass originating from the third eyelid at the medial canthus, covering a significant portion of the cornea in the right eye. The mass measured approximately 10x8 mm and was impairing vision (Fig. 1). There was also continuous lacrimation and a mild mucopurulent discharge from the right eye.

Based on the appearance of the lesion, a tentative diagnosis of ocular squamous cell carcinoma was made.

Fig1: *Photomicrograph image of dog showing macroscopic aspect of the TVT lesion covering most of the right eye*

A tissue biopsy from the ocular mass was collected and submitted to the School of Veterinary Medicine Pathology laboratory for cytology and histopathology. Impression smears were immediately prepared from the biopsied tissue, stained with Giemsa, and examined microscopically. Additionally, a portion of the tissue was fixed in 10 per cent formalin, embedded in paraffin, sectioned, and stained with Haematoxylin and Eosin (H&E) for histopathological examination.

The Giemsa-stained smears revealed round to ovoid neoplastic cells with large, variably-sized round nuclei, coarse nuclear chromatin, a high nucleus-to-cytoplasm ratio, and abundant vacuolated cytoplasm, which provided clear evidence of CTVT, ruling out the initial tentative diagnosis of squamous cell carcinoma (Fig. 2).

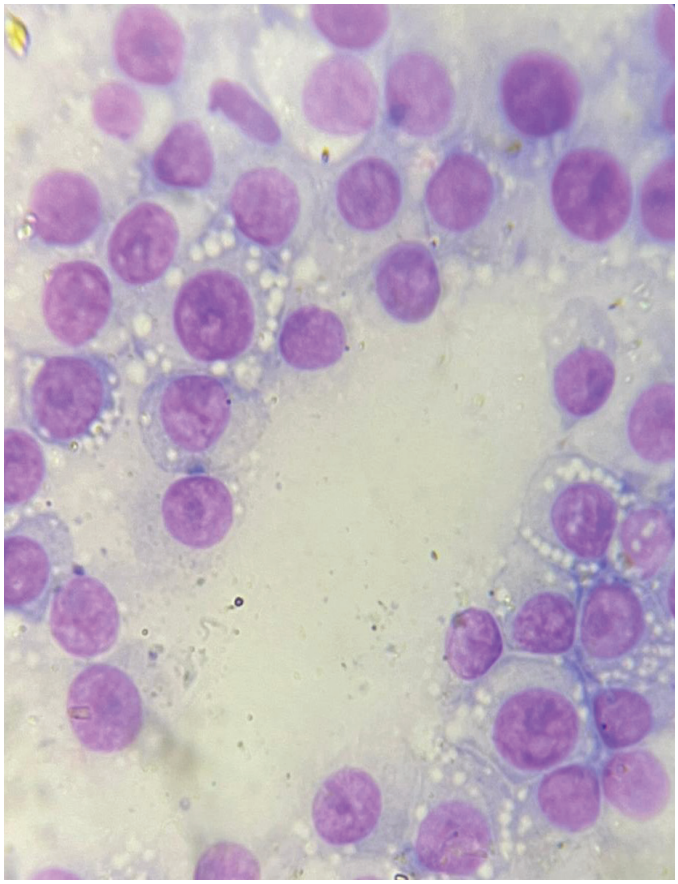

Fig 2: *Photographic image of cytological picture of CTVT showing lymphocytic subtype with intracytoplasmic vacuoles (x100 Giemsa stain)*

Histopathological examination showed loose sheets of round to ovoid polyhedral cells with prominent, centrally placed nucleoli and frequent mitotic figures. The cells appeared in confluent sheets or rows, separated by sparse fibrous stroma and infiltrated by macrophages, lymphocytes, and plasma cells. Additionally, a few new blood vessels were observed (Fig. 3).

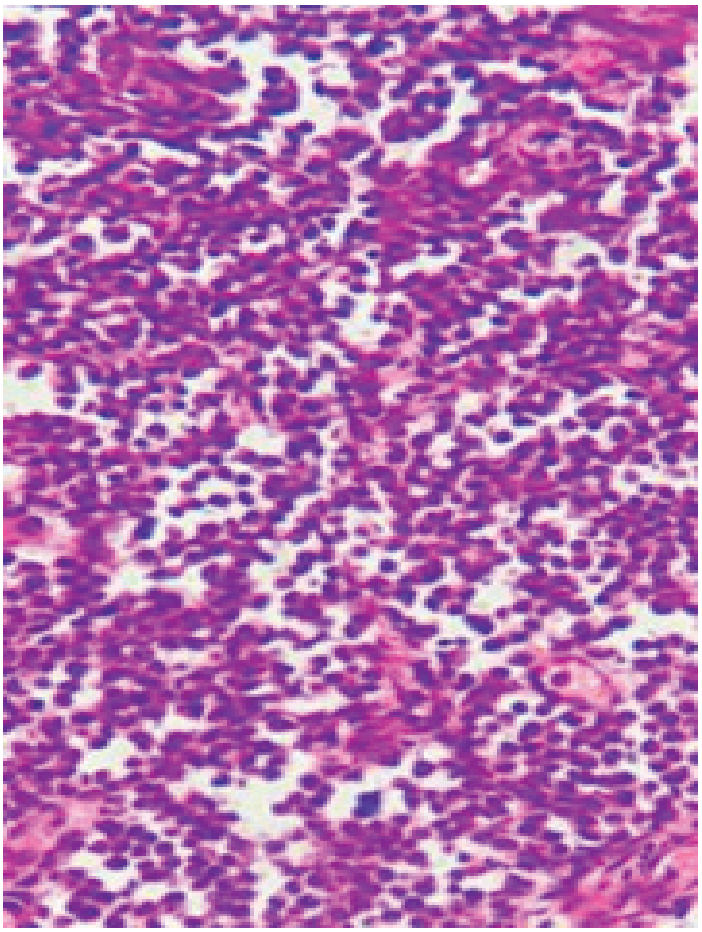

Fig 3: *Histopathological image of biopsied tissue showing loose sheets of round, ovoid, loosely arranged polyhedral cells showing centrally placed nucleoli along with frequent mitotic figures and a few new blood vessels, fibrous stroma, infiltrated by macrophages, lymphocytes, and plasma cells (H&E x100)*

Following these findings, the owner was contacted and asked to bring the dog to the clinic on 7 August, 2022, for a thorough examination for any genital evidence of CTVT, haematological evaluation, and therapeutic intervention. A detailed physical examination did not reveal any evidence of genital or other extragenital CTVT. Blood samples collected in EDTA for haematological analysis showed values within the normal range.

Based on these findings, a definitive diagnosis of extragenital CTVT in the right eye was established. The therapeutic plan involved administration of vincristine sulphate at a dosage of 0.025 mg/kg, equivalent to 0.7 mg, given intravenously once weekly over six weeks. The injections were administered on Days 1, 7, 14, 28, 35, and 42, with close monitoring of physical parameters throughout the chemotherapy as shown in Fig 4.

On Day 14, the dog's weight had decreased to twenty-four kg from the initial twenty-seven kg, and the owner reported reduced activity and poor appetite over the past week. The third vincristine dose was adjusted to 0.025 mg/kg based on the dog's current weight, resulting in a total dose of 0.6 mg administered intravenously. Haematological testing revealed leukopenia and thrombocytopenia, with a decrease in total RBCs and haemoglobin, although still within the normal range.

Due to leukopenia, thrombocytopenia, and poor appetite, the fourth vincristine dose was postponed by one week. Supportive treatment was provided, including subcutaneous administration of Synulox® (1.5 ml daily for four days), intravenous fluid therapy with dextrose saline (250 ml over two days), and oral administration of mirtazapine (15 mg daily for four days) to stimulate appetite. Within a week, the dog's weight increased to 25.2 kg, with improved clinical parameters.

The fourth vincristine dose was administered on Day 28, followed by the fifth and sixth doses on Days 35 and 42, respectively. By the end of the treatment period, the dog's vital parameters and haematological values were within normal ranges.

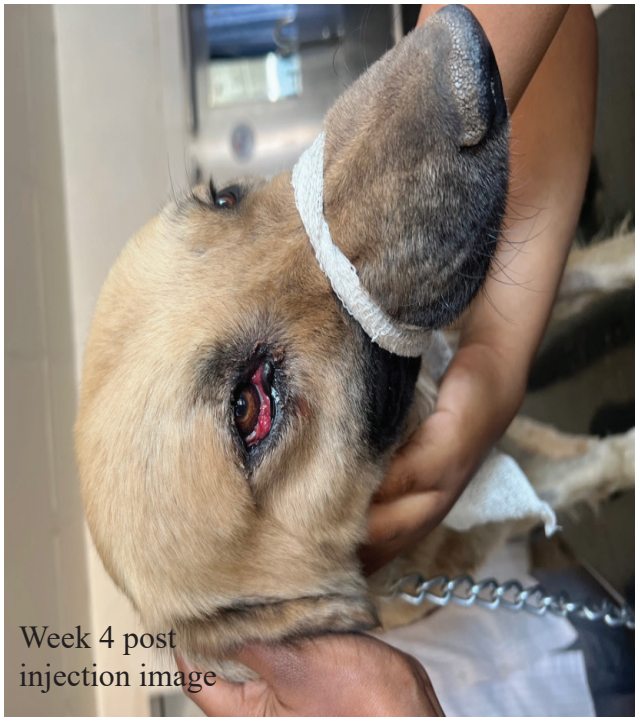

Figure: Weekly progress on treatment

A follow-up with the owner indicated that the dog had fully recovered, including the restoration of vision. No recurrence of the tumour was reported when the owner was contacted 12 months after the final injection.

Discussion

Canine Transmissible Venereal Tumour (CTVT) is commonly localised in the genitalia, though rare extra-genital manifestations—including cutaneous, oral, nasal, and ocular forms—are documented (12, 13, 14, 15). This transmissible cancer usually spreads through direct interaction, where viable tumour cells are transferred to damaged skin or mucosa during activities like biting, licking, or sniffing. Less frequently, CTVT spreads through hematogenous or lymphatic routes (12, 16).

This case was the first reported instance of a primary ocular CTVT without genital involvement in Lusaka, Zambia. Microscopically, this tumour exhibited round, oval cells with prominent nuclei and mitotic figures, consistent with descriptions by Behera *et al.* (2) and Laissaoui *et al.* (17). Although lymphocyte-mediated cytotoxicity can cause tumour regression in some cases, this response was absent in our patient. Given CTVT's known sensitivity to vincristine sulphate, this drug was chosen for treatment (18, 19, 20).

Studies suggest that mixed-breed dogs are more susceptible to CTVT, with ocular or anal presentations occurring in fewer than 5 per cent of cases (14). Despite CTVT's widespread presence and varied clinical forms, the tumour may be underdiagnosed in regions lacking awareness of its epidemiology and presentation. Further studies are needed to characterise the frequency and clinical implications of extra-genital CTVT manifestations (14).

Ozgencil *et al.* (16) highlighted the importance of including round cell tumours and ocular squamous cell carcinoma in the differential diagnosis of ocular lesions in canines. Similarly, the researchers initially suspected ocular squamous cell carcinoma based on clinical presentation, as noted by Takiyama *et al.* (21). Other cases of primary intraocular CTVT without genital involvement have been reported, such as by Sritrakoon *et al.* (22) and Gowtham *et al.* (23).

Sritrakoon *et al.* (22) reported that chemotherapy alone often failed to achieve complete remission in intraocular CTVT, necessitating enucleation of affected eyes. However, the current case demonstrated a successful outcome with vincristine treatment alone. The dog developed common chemotherapy side effects, including leukopenia, thrombocytopenia, appetite loss, and weight loss, which resolved with supportive care before continuing the vincristine regimen. This aligns with findings by Tella *et al.* (18) and Singh and Sood (19), where vincristine alone was effective for treating CTVT in genital and nasal locations. Surgical excision alone has a high recurrence rate (20-60%) and is only effective for small, localised nodules (20).

CTVT is generally curable with chemotherapy, with vincristine proving to be one of the most effective agents (25). This study observed tumour regression and vision improvement within six weeks of vincristine treatment. Pereira *et al.* (26) and Chikweto *et al.* (27) recommend including CTVT in the differential diagnosis for extra-genital ocular masses, especially in regions with high CTVT prevalence.

Conclusion

This case represents a rare primary ocular CTVT without previous genital or extra-genital involvement, making metastatic spread unlikely. Cytological examination provides a cost-effective diagnostic approach for CTVT, which responds well to vincristine chemotherapy, preventing further ocular damage and restoring vision. CTVT should be considered in the differential diagnosis for extra-genital ocular masses, particularly in regions with a high prevalence of this transmissible tumour.

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Conflict of Interest

Authors declare no conflict on interest.

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