

Cyto-histopathological study of transmissible venereal tumour in female dogs

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Abstract

Canine Transmissible Venereal Tumour (CTVT) is an infectious, naturally occurring round-cell tumour that primarily affects the outside of the genitalia of both male and female dogs. It is physically transmitted through direct contact with injured skin or mucosa, that mainly affects dogs and other canids. The present study aimed to assess the occurrence, cytopathology and histopathology of transmissible venereal tumour of dogs in Jaipur city of Rajasthan, India. In this study, tissue samples of the genital tract from 121 female dogs were collected from different Animal Birth Control (ABC) programme centres and different clinics in Jaipur. Gross examinations of these samples showed 141 lesions in different parts of the genital tract, out of which 9 cases of Transmissible Venereal Tumour, with an occurrence of 6.38 per cent (9/141) as lesion-based occurrence were observed. Cytopathological analysis revealed tumour cells with distinct, cytoplasmic vacuolation and centrally located round nuclei with loose chromatin. Histopathological analysis revealed that the tumour is made up of diffuse sheets of round cells and small amounts of connective tissue stroma, with predominant infiltration of neutrophils and lymphocytes. This study gives valuable insights as an important reproductive pathology in bitches.

Keywords: Cytopathological, Genital tract, Histopathological, TVT

Highlights

- Studied on TVT in bitches of Jaipur, that contributes valuable data on its occurrence and pathology.
- Emphasis was on TVT affected area diagnosed by Cytology and histopathology.
- Suggests early neutering of stray dogs to reduce TVT incidence.

INTRODUCTION

Dogs have become the focal point of attention for a wide range of societal groups. The monoestrus nature of dogs, along with their lengthy inter-oestrus interval, presents a constraining element; in order to maximize economic returns, it is imperative to ensure a litter is produced during each breedable oestrous cycle. Canine breeding has gained a tremendous popularity within this decade and dogs are thought to be the best companions for people. In order to prevent reproductive disorders and to prepare for future breeding, breeders and the majority of pet owners are generally quite concerned about their pets' reproductive health (Priyadarshini et al., 2021).

TVT is an infectious, naturally occurring round-cell tumour that primarily affects the outside of the genitalia of both male and female dogs. It can spread from one animal to another by dog bites, sniffs, or licks of the tumour-affected areas, as well as by the exfoliation and transplantation of neoplastic cells that take place during sexual intercourse (Cohen, 1985;

Johnston, 1991; Amaral et al., 2004). It primarily affects young, sexually mature animals and is typically spread during coitus. This kind of tumour developed in dog and other social canids, probably during coitus there are extensive abrasions and bleeding at mucosa of the vagina, making tumour transplantable. It is also known as canine transmissible sarcoma and round cell tumour of dogs, has been recorded from all over the world (Goldschmidt & Hendrick, 2002). Additionally, sexually transmitted diseases like Transmissible Venereal Tumour (TVT) are more common, particularly in stray dogs with uncontrolled practices. In contrast to any other domestic animal, dogs are prone to cancer. The external genitalia of either sex are most frequently impacted because of the unique way that sexual contact disseminates the disease. Less frequently, licking or sniffing can spread the tumour to the skin, rectum, and nasal or oral cavities (Albanese et al., 2002). Based on present results, the science of cytopathology, particularly impression smears are cost effective, rapid, simple and accurate diagnostic tool. Taking into

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consideration all these the present study was conducted to study the pathological aspects of this tumour for early and rapid diagnosis. Early spaying and neutering of stray dogs may help to lower the incidence of TVT and prevent undesired mating (Nair, 2012).

MATERIALS AND METHODS

For the current study, 121 samples of the genital tract of dog (*Canis familiaris*) irrespective of age and breed were collected from different animal birth control (ABC) programmes and different clinics in Jaipur. Tissue samples were also collected from the ovariohysterectomized mass and submitted to the Department of Veterinary Pathology, Postgraduate Institute of Veterinary Education and Research (PGIVER), Jaipur. Impression smears were made from vaginal tumour masses. The imprints were prepared according to the technique described by Tribe (1965)

Table 1. Occurrence of affections in the cervix, vagina and vulva of female dogs

Organ/ Affection	No.	Occurrence
1. Cervix	04	2.84 %
(i) Cervicitis	04	2.84 %
2. Vagina and Vulva	16	11.35 %
(i) Hyperplasia	03	2.13 %
(ii) Vaginitis	04	2.84 %
(iii) Transmissible venereal tumour	09	6.38 %

and Tseng et al. (1999). The Giemsa working solution was prepared by mixing it with distilled water in the ratio of 1:10 and stained for 30 min. The smears were evaluated cytologically for initial diagnosis of tumours (Allen et al., 1986). The samples showing frank macroscopic lesions were collected for further histopathological examination in 10 per cent buffered formalin. The histopathological examination was done after processing by the acetone and benzene technique (Lillie, 1965; Culling, 1974). The tissue sections of

4–6-micron thickness were cut and further processed for routine staining. The tissue sections were stained using the haematoxylin and eosin method (Luna, 1960; Bancroft et al., 2013) for histopathological examination.

RESULTS

This condition was noticed in 9/141 (6.38 per cent) cases out of 141 lesions in 121 sample of the female genital tract. All lesions found in cervix, vagina and vulva cases occurrence and macroscopic, cytological, and histopathological results were described in Table 1 and Table 2, respectively.

Values represent the number of cases observed among a total of 141 genital tract lesions recorded from 121 female dog samples. Occurrence (%) was calculated as: (Number of cases ÷ Total lesions) × 100. Multiple lesions could be present in a single sample; hence, total lesions exceed the total number of samples.

Descriptions indicate the general gross appearance of lesions associated with each specific condition. Observations were recorded in samples collected from the ABC programme and clinical examination of the reproductive tract.

DISCUSSION

In the present study, the occurrence was recorded in 6.38% (9/141) cases, which was within the limits of Hadiya et al. (2021). Higher occurrence was recorded by Ortega-Pacheco et al. (2007), Kachhwaha et al. (2010), Costa et al. (2019), Priyadarshini et al. (2021) and Yashaswi (2022) as 15.3 per cent, 13.12 per cent, 12.6 per cent, 94.4 per cent and 25.46 per cent, respectively. Lower incidence was reported by Juneja et al. (2021) as 3.36 per cent. Grossly, showing multi-nodular and reddish mass at the vagina observed in this study and in some cases at vulva superficial part was ulcerated and easily bled was in accordance

Table 2. Macroscopic, cytological and histopathological results in transmissible venereal tumour

Macroscopic study	Grossly, showing multi-nodular and reddish mass at vagina and in some cases at vulva superficial part was ulcerated and easily bled (Fig. 1).
Cytological study	Cytopathological analysis revealed tumour cells with distinct, cytoplasmic vacuolation and centrally located round nuclei with loose chromatin. Histiocytes showing central to eccentric nuclei, anisokaryosis, and coarse chromatin (Fig. 2 & Fig. 3).
Histopathological study	Histopathological analysis revealed that the tumour is made up of diffuse sheets of round cells and small amounts of connective tissue stroma, predominant infiltration of neutrophils and lymphocytes. Individual neoplastic cells had a round hyperchromatic nucleus with a distinct eosinophilic nucleolus and stippled chromatin. The cytoplasm was moderate and granular, with distinct cytoplasmic borders (Fig. 4 & Fig. 5).

A diagnostic approach for the TVT



Fig. 1. Photograph showing multinodular and reddish mass at vagina

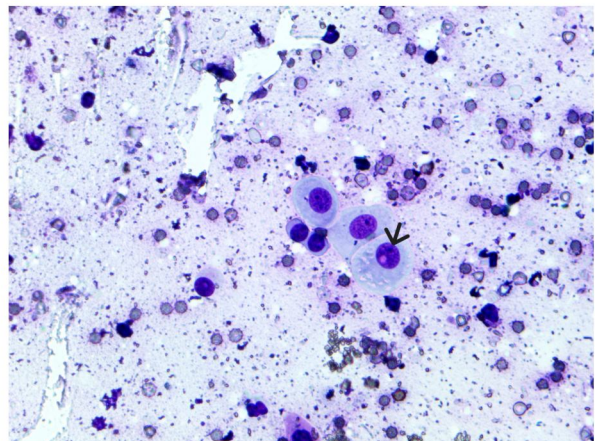


Fig. 2. Photomicrograph showing central to eccentric nuclei, anisokaryosis, and coarse chromatin. Giemsa stain, 400X

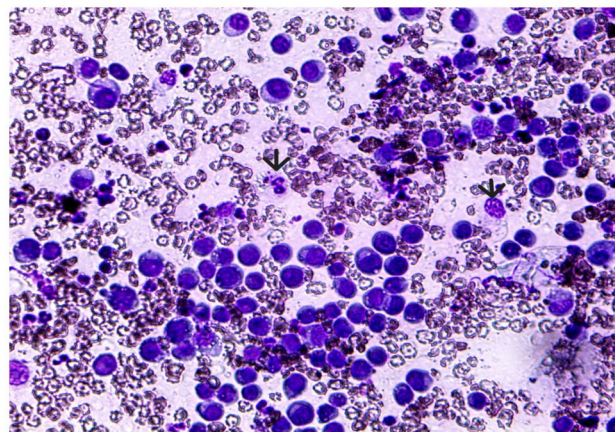


Fig. 3. Photomicrograph showing distinct, clear cytoplasmic vacuoles, centrally located round shaped nuclei with coarse chromatin. Arrow showing mitotic figures in TVT cells. Giemsa Stain, 400X

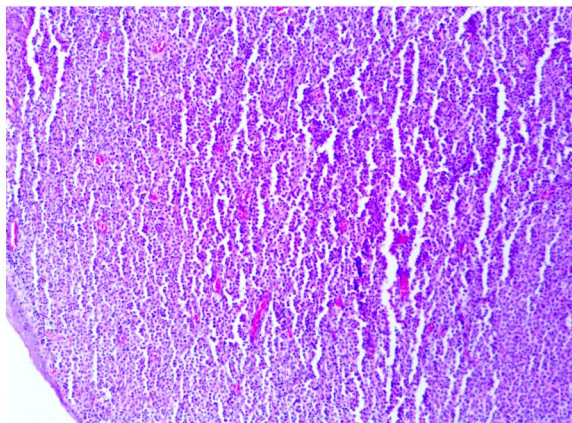


Fig. 4. Microphotograph showing diffuse sheets of round cells along with delicate strands of fibrous stroma. H&E 100X

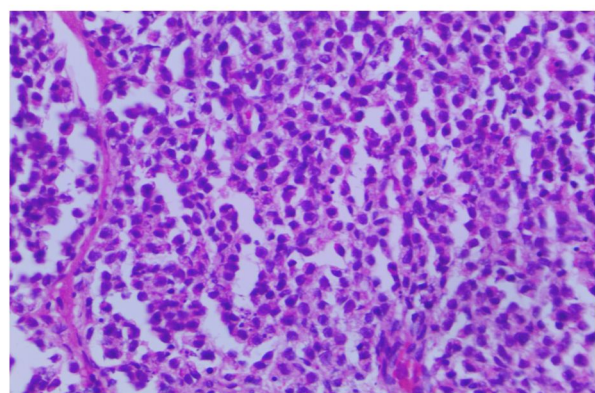


Fig. 5. Microphotograph showing vacuolated cytoplasm of histiocytes resembling foam cells. presence of fibrous strands with round hyperchromatic nuclei. H&E 400X

with Thangathurai et al. (2008). Cytopathological analysis revealed tumour cells with distinct, cytoplasmic vacuolation and centrally located round nuclei with loose chromatin. Histiocytes showing central to eccentric nuclei, anisokaryosis, and coarse chromatin. Similar observations were also reported by Thangathurai et al. (2008), Mugale et al. (2014), and Priyadarshini et al. (2021).

Histopathologically, the tumour is composed of diffuse sheets of round cells and scant amounts of connective tissue stroma, and newly formed congested blood vessels. The cytoplasm was moderate and granular, with distinct cytoplasmic borders. These observations are in accordance by those of Park et al. (2006), Baştan et al. (2008), Thangathurai et al. (2008), Mugale et al. (2014), Alkan et al. (2017), Yadav et al. (2018), Priyadarshini et al. (2021), and Leil et al. (2022).

The nuclear and cytoplasmic distinctions between TVT and histologically comparable histiocytomas, however, can be negligible on standard H&E-stained slides. Therefore, cytological preparations should be employed to establish the diagnosis because they have higher nuclear preservation (Goldschmidt & Hendrick, 2002).

According to the current research, cauliflower-like or nodular tumour growth on external genitalia, bloody discharge were found in gross lesion. The occurrence of TVT was found 6.38 per cent. The most prevalent clinical symptom seen in dogs with TVT was genital licking. Other symptoms include swelling of genitals, profuse bleeding from the affected area, firm but easily friable texture. Cytology is an effective, rapid diagnostic tool due to superior nuclear preservation for screening in stray dogs but most reliable diagnostic for canine TVT is histopathology, which revealed tumour cells with a large, round top pleomorphic nucleus with conspicuous centrally located nucleoli and frequent mitotic patterns.

This study gives valuable region-specific data and demonstrates a sound methodological approach through the combined use of cytology and histopathology. This diagnostic framework can aid

veterinarians in addressing a common clinical condition in dogs more effectively, particularly in regions where TVT remains prevalent.

As a limitation of the study, TVT affects both sexes, and including males would have provided a complete picture of prevalence in the region. TVT can also occur extragenitally (nasal, cutaneous, oral). Even though none were considered here, and only female genital cases were included.

Conflict of interest: The Authors have no conflict of interest in this study.

Author's contribution: PK: Wrote first version of research, collect sample and made cytological and histopathological slides; RD: Create original draft of research and studied cytology and histopathological slide; MA: Offered continuous guidance throughout the study, microphotography and conducted the final editing to ensure the article's quality; AM, FL, KSG: Assist in sample collection and assist in writing.

Data availability statement: The Necessary data is there in relation to this research, and upon request, it would be presented.

Ethical approval: There is no need for an ethical approval committee because sample collection was done from the Animal Birth Control Programmes, in which they perform ovariohysterectomy from different areas of Jaipur.

Use of artificial intelligence tools: During the preparation of this work, the author(s) used no artificial intelligence tools. The authors take(s) full responsibility for the content of the publication.

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