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Sunil Kumar Jangid

Department of Veterinary
Pathology, Arawali Veterinary
College, Sikar, Rajasthan, India

Ashok Prajapat

Livestock Products Technology,
Arawali Veterinary College,
Sikar, Rajasthan, India

Sarjna Meena

Department of Veterinary
Pathology, Post Graduate
Institute of Veterinary
Education and Research, Jaipur,
Rajasthan, India

Manish Agrawal

Department of Veterinary
Pathology, Post Graduate
Institute of Veterinary
Education and Research, Jaipur,
Rajasthan, India

Naveen Kumar

Department of Veterinary &
Animal Husbandry Extension
Education Arawali Veterinary
College, Sikar, Rajasthan, India

Ram Kumar Gahlot

Department of Veterinary
Biochemistry, College of
veterinary and Animal Science
Bikaner, Rajasthan, India

Neelam Kumari Faran

Department of Veterinary
Parasitology, Arawali Veterinary
College, Sikar, Rajasthan, India

Vijay Kumar Yogi

Veterinary Officer, Department
of Animal Husbandry, Barmer,
Rajasthan, India

Corresponding Author:

Sunil Kumar Jangid

Department of Veterinary
Pathology, Arawali Veterinary
College, Sikar, Rajasthan, India

Canine transmissible venereal tumour

Sunil Kumar Jangid, Ashok Prajapat, Sarjna Meena, Manish Agrawal, Naveen Kumar, Ram Kumar Gahlot, Neelam Kumari Faran and Vijay Kumar Yogi

Abstract

Canine transmissible venereal tumour (CTVT) is a unique, contagious neoplasm affecting the genital organs of dogs. In this study, the identification of tumours was accomplished utilizing both cytological and histopathological methodologies. Fine Needle Aspiration Cytology (FNAC) and impression smears were deployed for the cytological evaluations of both palpable and non-palpable neoplastic masses. A comprehensive collection of 58 samples was procured from diverse canine breeds. Within this cohort, round cell tumours were identified, constituting 13.79% of the cases. Specifically, among these round cell tumours, canine transmissible venereal tumour manifested with an incidence rate of 50%. Cytological analysis revealed sheet-like patterns, cytoplasmic vacuoles, and variations in nuclear and cellular size. Histopathology demonstrated neoplastic structures with rounded or polyhedral morphology, accompanied by anisokaryosis and anisocytosis, and noticeable mitotic figures. Neoplastic cells appeared mainly round, oval, or polyhedral in outline (Fig. 77), featuring large, round, hyperchromatic nuclei with distinctly marginal chromatin and prominent central nucleoli. Numerous mitotic figures were observed, and an increased nuclear-cytoplasmic ratio, anisocytosis, and anisokaryosis were evident. Cytopathological examination plays a crucial role in the initial diagnosis of CTVT, offering a non-invasive and cost-effective method to evaluate cellular characteristics.

Keywords: Canine transmissible venereal tumour, TTV, cytology, histopathology, neoplasm, FNAC

1. Introduction

Malignant neoplasms constitute a significant cause of mortality in companion animals (Bonnett *et al.*, 2005) [2], ranking second only to human cancer-related deaths (Siegel *et al.*, 2013) [19]. The incidence of cancer in dogs surpasses that in humans, demonstrating a twofold higher frequency (Rungspipat *et al.*, 2003) [18]. Canine transmissible venereal tumour (CTVT), also referred to as transmissible venereal sarcoma, Sticker's sarcoma, venereal granuloma, and infectious sarcoma, represents a communicable venereal tumour found in dogs, its prevalence is notably higher in dogs that closely interact, as well as in stray and wild dogs displaying unrestrained sexual activity (Boscos and Ververidis 2004) [3]. A groundbreaking moment in oncology occurred in 1876 when the Russian veterinarian Novinsky demonstrated the tumour's transplantation between dogs by infecting them with tumour cells. (Das and Das 2000) [7]. To date, only three naturally transmissible and contagious tumours are recognized in mammals, namely CTVT, the Tasmanian devil facial tumour disease (DFTD), and a comparable tumour affecting Syrian Hamsters. (Mel'endez-Zajgla and Maldonado., 2007) [16]. Diagnostic cytology, involving the meticulous microscopic scrutiny of cellular components, serves as a pivotal tool for real-time lesion characterization and disease diagnosis. Renowned for its high specificity, sensitivity, and widespread acceptance, cytology plays a crucial role in diagnosing various ailments in both human and animal populations (Cohen *et al.*, 2003) [4].

2. Materials and Methods

2.1 Source and Collection of Samples: Source and Acquisition of Samples: This investigative endeavor was conducted at the Department of Veterinary Pathology, Post Graduate Institute of Veterinary Education and Research, Jaipur, spanning the temporal confines from August 2020 to February 2021. The corpus of this study comprised specimens procured from 58 instances of spontaneously occurring tumour masses, sourced from canines

of varied breeds and age demographics, inclusive of both male and female subjects. The tissue samples for this investigation were derived from diverse anatomical locales, including the Government Veterinary Polyclinic (Department of Animal Husbandry), the Department of Veterinary Surgery and Radiology, the Department of Veterinary Pathology at PGIVER, Jaipur, and the Veterinary Hospital (Help in Suffering/HIS, Jaipur).

2.2 Macroscopic Examination: Antecedent to any surgical interventions, a comprehensive macroscopic scrutiny was systematically executed on all tumour masses. This entailed a meticulous assessment for indications of ulceration and precise localization on the anatomical plane. Following surgical excision, an exhaustive analysis was performed, encompassing parameters such as dimensions (quantified in centimeters), morphology (circular, oval, irregular, multilobulated, etc.), mass (in grams), consistency (soft, hard, firm, cystic, etc.), and the chromatic attributes of the excised tumour surface.

2.3 Cytological Examination: Cytological evaluations were orchestrated through the deployment of fine needle aspiration cytology (FNAC) and impression smear/touch imprint cytology methodologies, as delineated by Cowell and Valenciano (2014) [5].

2.4 Histopathological Examination: Dissected tissue specimens underwent immersion in a 10 percent buffered formalin solution and were subjected to histopathological scrutiny employing the hematoxylin and eosin staining methodology, adhering to established protocols by Luna (1960) and Culling (1974) [22, 23].

3. Results and Discussion

3.1 Incidence of Transmissible Venereal Tumour

Four cases of transmissible venereal tumour (TVT) were documented, yielding an incidence of 6.90%. These findings closely align with the observations made by Dadhich (2004) [6], who reported a similar incidence of 4.61%.

3.2 Gross morphology, Cytology and Histopathology of Transmissible Venereal Tumour

The tumour masses were located at the vagina and penis, exhibiting distinctive characteristics. At the penis, the tumour manifested as pedunculated, multilobular, and cauliflower-like, displaying a reddish-white cut surface (Fig. 1), consistent with findings reported by Kolawole *et al.* (2020) [14]. In the vagina, the tumours were characterized by a hard consistency, nodular appearance, and a reddish-white colour (Fig. 2), corroborating with the results reported by Balima *et al.* (2020) [1].

Cytologically, aspirate smears of TVT revealed high cellularity with round cells arranged individually and in sheet-like patterns. Neoplastic cells exhibited basophilic cytoplasm (Fig. 3), presenting a distinctive feature of clear, cytoplasmic punctate vacuoles. Nuclei were round, centrally located, with one to three basophilic nucleoli and coarse chromatin (Fig. 4). The presence of anisocytosis, anisokaryosis, and multinucleated cells was noted (Fig. 5). These observations align with various studies, including those by Krithiga *et al.* (2005) [15], Park *et al.* (2006) [17], Thangathurai *et al.* (2008) [21], Gupta and Sood (2012) [12], Igor *et al.* (2012) [12], Ganguly *et al.* (2013) [8], Simon *et al.* (2016) [20], and Kolawole *et al.* (2020) [14].

Microscopically, tissue sections revealed sheets of individual cells arranged in rows or cords within a delicate stroma. Neoplastic cells appeared mainly round, oval, or polyhedral in outline (Fig. 6), featuring large, round, hyperchromatic nuclei with distinctly marginal chromatin and prominent central nucleoli. Numerous mitotic figures were observed, and an increased nuclear-cytoplasmic ratio, anisocytosis, and anisokaryosis were evident (Fig. 7). These microscopic findings parallel those reported by Krithiga *et al.* (2005) [15], Goswami *et al.* (2008) [9], Thangathurai *et al.* (2008) [21], Kashyap *et al.* (2013) [13], and Hosseini *et al.* (2014) [11].



Fig 1: Gross photograph showing pedunculated, multilobular and cauliflower-shaped TVT growth on the penis

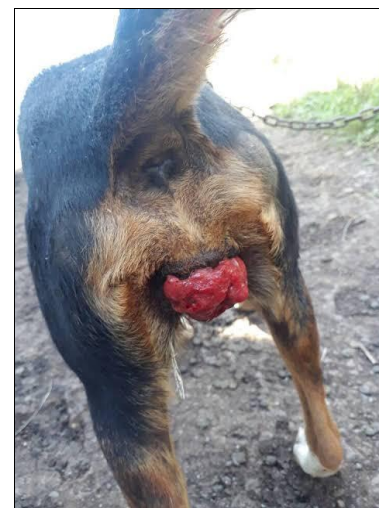


Fig 2: Gross photograph showing nodular and reddish white TVT growth located in the vaginal area

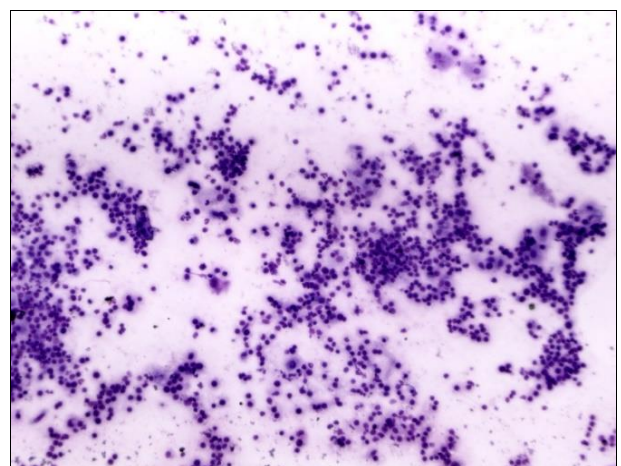


Fig 3: Photomicrograph of FNAC illustrating elevated cell density of round cells, sheet like pattern of arrangement featuring basophilic cytoplasm. Giemsa stain, 100X

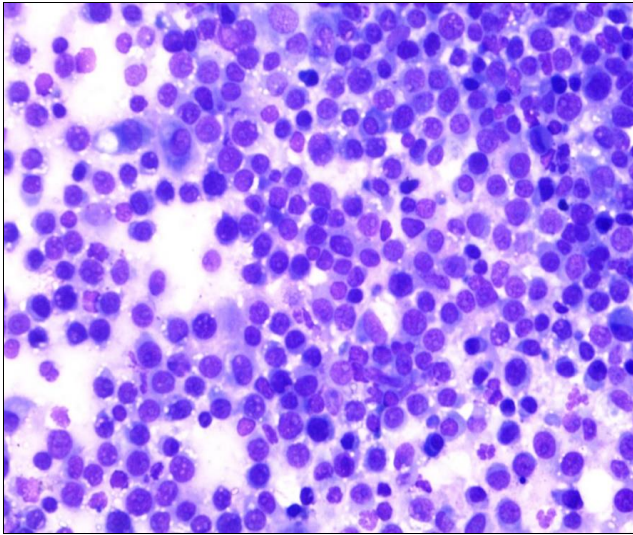


Fig 4: Photomicrograph of FNAC revealing well-defined cytoplasmic vacuoles, along with nuclei exhibiting a round shape and central placement, characterized by coarse chromatin. Giemsa stain, 400X

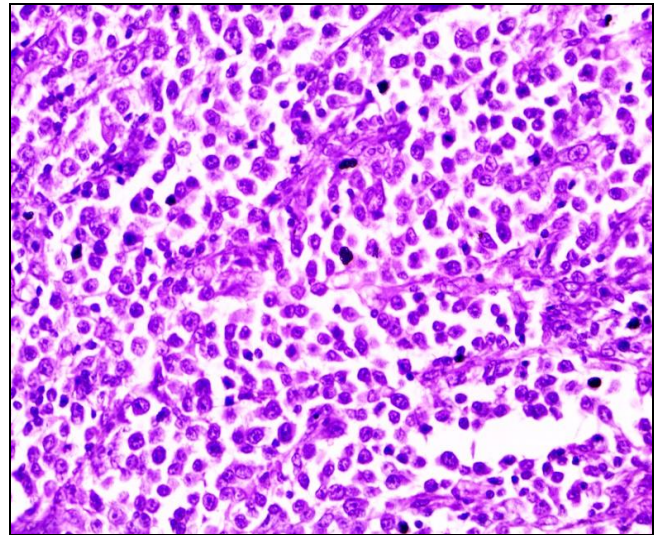


Fig 7: Photomicrograph illustrating prominent, round nuclei with intense chromaticity, exhibiting distinctly located chromatin at the periphery and central nucleoli, along with a visible mitotic figure. H & E stain, 400X

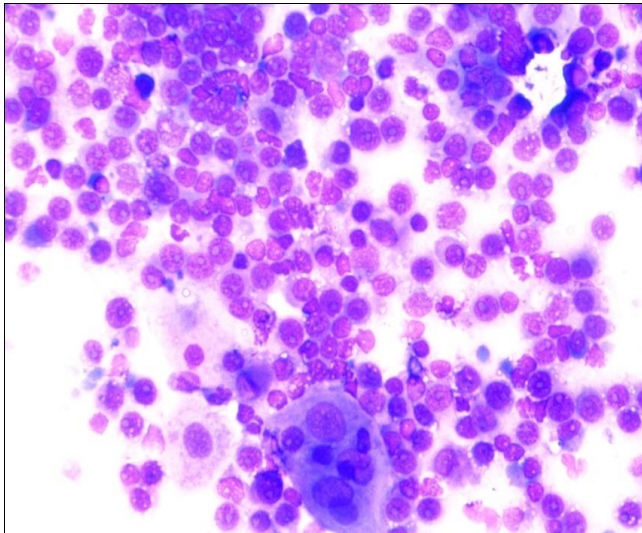


Fig 5: Photomicrograph of FNAC smear displaying binucleated, trinucleated and multinucleated cells. Giemsa stain, 100X

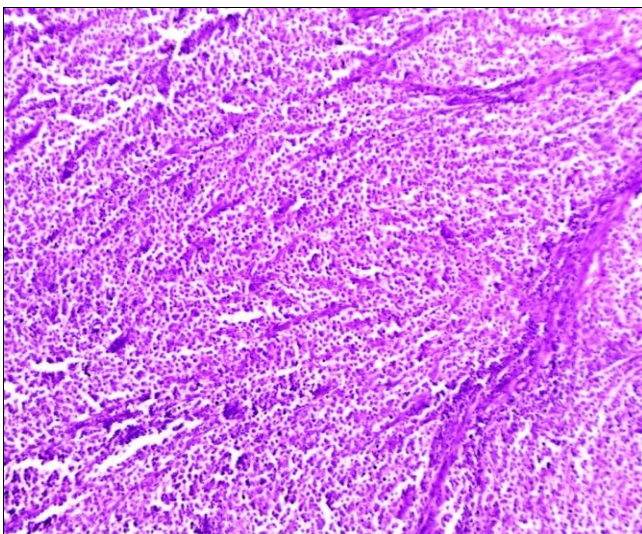


Fig 6: Photomicrograph depicting layers of singular, round to oval cells arranged in rows or cords within a delicate stroma. H & E stain, 100X

4. Conclusion

In the current investigation, among the 58 cases examined, 4 cases of CTVT (6.90%) observed. Canine Transmissible Venereal Tumour displayed high cellularity with round cells arranged individually and in sheets, basophilic cytoplasm characterized by clear, cytoplasmic punctate vacuoles. Nuclei were round, centrally located, with one to three basophilic nucleoli and coarse chromatin. Cytopathology has important role in the diagnosis of CTVT, emphasizing its role in providing rapid, reliable, and cost-effective diagnostic information. Incorporating cytopathological assessments into routine veterinary practice enhances the efficiency of CTVT diagnosis and contributes to more effective clinical management strategies.

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